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ABSTRACT

This report describes a project designed to promote infusion of computer technology into graduate-level curricula in communication disorders (Here often called "Communication Sciences and Disorders"). The Leadership Project's major goal was to improve the training of doctoral level faculty, administrators, and researchers in the uses of microcomputers by planning, conducting, and evaluating workshops; developing materials; and disseminating information for the faculty and other personnel. The five-phase workshops established a common knowledge base among participants, provided information on the implications of computer technology, addressed problems of change in computer technology, considered fundamental issues for incorporating computer technology into curricula, and provided exemplars of solutions to issues raised in the workshops. This report briefly discusses workshop objectives and format. An infusion guide, for facilitating the infusion of computer technology into the graduate level curricula in communication disorders, is presented. The workshops received generally positive evaluations, and participants have established a network to promote awareness of activity in other programs. Two papers, "Faculty Development in Computer Technology: One University's Experience" (N. Bartel) and "Technological Change and the Future" (H. Niebuhr, Jr.), are included in the appendices as well as a list of workshop participants and a workshop agenda. (CB)

FINAL REPORT

Title:	Leadership Training in Computer Technology
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Recipient:	American Speech-Language-Hearing Association 10801 Rockville Pike Rockville, MD 20852
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PURPOSE

The purpose of this project was to promote infusion of computer technology into the curricula of graduate and post-graduate educational programs in Communication Sciences and Disorders and related fields. It was to give a broad understanding of applications of the microcomputer to the present graduate students and hence to the future clinicians providing care for children with communicative disorders.

PROJECT GOALS

The goals of the Project were to:

1. improve the training of doctoral level faculty, administrators, and researchers in Communication Sciences and Disorders and Special Education in the uses of computer technology,

2. insure that curricular changes be instituted in these programs whereby graduate students receive interdisciplinary preservice training in the use of computer technology, and

3. facilitate opportunities for continued emphasis on preservice education in computer technology for leadership personnel in Communication Sciences and Disorders and in Special Education.

PROJECT OBJECTIVES

1. plan, conduct, and evaluate workshops for program directors, administrators, deans, and other faculty in doctoral and postdoctoral educational programs,

2. develop materials for use during the workshops, for use in future workshops conducted by ASHA, as well as by educational programs themselves, and,

3. provide for wide dissemination of information relative to computer technology to assist doctoral and master's level communication sciences and special education programs in the infusion process in their curricula.

INTRODUCTION

This Leadership Project was developed at approximately the same time as the American Speech-Language-Hearing Foundation (ASHF) "The Personal Computer as a Professional Tool" was held in Las Vegas in February, 1984. The Leadership Project was originally designed as a multi-tiered training program which would teach beginning and intermediate skills and assist with the integration process. In fact, the main thrust of the project was computer literacy as the first priority with integration of computer technology in the curriculum as a considerably lesser priority. During the American Speech-Language-Hearing Foundation Computer Conference in Las Vegas, there was a meeting with the faculty of several programs, the purpose of which was to find out what they

felt the issues should be in relation to this project. After much discussion it was determined that what was really needed was a plan of operation, some input from the graduate programs, some strategies for integration and the opportunity to address these needs with each other. Literacy was not the issue...the use of computers as professional tools had already happened. The real problems exist in the universities with lack of funding, lack of leadership and who should learn what from whom.

Project staff then developed objectives and activities to address the critical areas as determined through input from leadership faculty. Those objectives are reflected in the following section of this report.

Presentations which are pertinent to the change process and to the infusion process at the university level can be found in Appendix A. These two papers were selected to be part of this final report because they present the foundation on which the participants can build their strategies and therefore implement the changes necessary to accommodate technological advances.

WORKSHOP OBJECTIVES

OBJECTIVES OF WORKSHOPS

1. To provide workshop participants with a state-of-the-art overview of the scope and degree to which Communication Sciences and Disorders and Special Education services are being affected by computer technology in its service, administrative, and research activities.

2. To translate the understanding of item (1) above into a strategy for changes in personnel preparation programs.

3. To provide opportunity for conference participants to share related problems, concerns, and solutions concerning use of computer technology with each other.

4. To develop an understanding of technological changes in Communication Sciences and Disorders and Special Education in the context of broad societal change.

5. To consider problems and issues in bringing about changes in faculty and curricula in institutions of higher education in view of specific models of educational change.

6. To identify and discuss problems and issues inherent in attempts to introduce teaching about computer technology in personnel preparation programs in Communication Sciences and Disorders and Special Education.

7. To examine several prototopic programs which have resolved a number of the issues identified in item (5) above.

8. To provide opportunities for workshop participants to work in groups of common interest or concern in program or curriculum development activities.

WORKSHOP FORMAT

WORKSHOP FORMAT

It was decided that a workshop format would be the best avenue to accomplish the purposes of this project. There were three workshops held. The first two (September 21-23, 1984 and February 2-3, 1985) were held in New Orleans, Louisiana. The agendas, lists of participants and faculty can be found in Appendix B.

The workshops were designed to include didactic presentations of substantive content, and to provide ample opportunity for participants to interact with each other in goal-oriented but less structured ways through small group discussions. Opportunity was provided for optional hands-on experience with microcomputers and sharing of participant-developed software.

The workshops were designed to move participants through several phases of discussion:

Phase I was designed to establish a common knowledge base among workshop participants regarding the impact of computer technology in the fields of Communication Sciences and Disorders and Special Education. Consideration was given to state-of-the-art applications in service to clients and students in program management, record keeping, and research.

Phase II provided information on the implications of computer technology for doctoral programs. Appropriate questions considered included the following:

1) To what degree do the applications of computer technology in the field represent real departures form past practice, and to what extent to they merely reflect passing trends?

2) Is it possible to discern generic knowledge, skills, and attitudes in the field of computer technology so that educational programs may reflect these rather than knowledge, skills, and attitudes that are specific to the technology of today (and possibly obsolete tomorrow)?

3) To what extent does the "computer revolution" provide the perfect occasion for universities to re-examine their professional education programs in fundamental ways (i.e. such issues as the role of a "field-based" component, the relationship of Communication Sciences and Disorders and Special Education to each other and to other areas of education and human services); or a consideration of new forms of partnership with the profit sector, especially hardware and software companies?

4) Given the professional life expectancy of Communication Sciences and Disorders and Special Education personnel, how can the educational programs of TODAY prepare persons who will be in practice twenty or thirty years form now? What is the general relationship of computer technology to university programs, especially when it is likely to change more quickly than its university counterpart?

Phase III concerned itself with the problems of change--how to recognize it, discern its implications, facilitate it or accommodate to it where appropriate. This phase was designed to move from a general consideration of our changing society to a more focused look at the problem of bringing about change in university curricula. Issues in faculty development as they pertain to use of technology in the curricula were reviewed, and specific approaches to the updating of faculty in computer technology were examined.

Phase IV addressed fundamental issues which need to be resolved if doctoral programs wish to incorporate relevant elements of computer technology into their curricula. Discussion centered on the following questions:

1) What is the content that students in doctoral programs should be exposed to?
2) How is this content conveyed?
3) What is the role of a laboratory or field experience in such training?
4) What is the primary focus--teaching about computers, or using computers to teach?

Phase V provided exemplars of particular solutions to issues that have been raised in Phase IV. Specifically, demonstrations of computer-assisted instruction were provided in a Special Education program, an example of a technically oriented approach in a Communication Sciences and Disorders program was examined, and a "learning through exposure" approach was described. Examples of applications can be found in the infusion guide on page 15.

SUMMARY OF SMALL GROUP DISCUSSIONS

AND

WORKSHOP EVALUATIONS

SUMMARY OF SMALL GROUP DISCUSSIONS

September 21-23, 1984

Gary E. Rushakoff, Ph.D.

New Mexico State University

There was a consensus within the participants of the conference that most doctoral students in communication disorders, special education, and related fields would need some level of training in computer technology and applications. Many of the participants felt that doctoral level students should have at least some basic computer literacy training, but that this training should be individualized for the needs of each student. It was possible that doctoral level students would learn this information on an "individual study" basis and not through formal course instruction.

The participants felt that while most doctoral level students should have varying levels of computer technology/application training, there should not be any kind of national competency level set. If students want more training than can be efficiently offered by the communication disorders, special education, and related fields departments, they may have to add time to their program to receive additional training in computer technology/applications. There may be some doctoral students who enter the program with sufficient training and background and may not need additional instruction. There was feeling that a department's reputation in computer expertise may neither attract or scare away potential doctoral students.

The basics of computer technology and application can be taught within the communication disorders, special education, and related fields departments and should not compete with course offerings in computer science departments. There was a feeling that many of the skills taught in computer science department courses were not critical for most doctoral level communication disorders, special education, or related fields students.

The group also felt there was a problem with communication disorders and special education departments receiving money to obtain equipment to train doctoral level people. There was also a feeling that some administrators are not too supportive of expanding computer technology in clinical communication disorders and special education programs. There was a feeling that the university administration does not feel that computer courses taught outside of the computer science departments may be necessary. This requires some departments to provide a rationale for why their clinically based training in computer technology and applications may not be fulfilled by a computer science department course.

Obtaining equipment and software is often accomplished by a somewhat self-appointed "guru" within the communication disorders, special education and related fields programs. Often this is the individual who first became interested in computer technology and therefore had a major voice in deciding which brand of equipment and which software should be purchased. Sometime these individuals may make an incorrect choice, however as was mentioned during the conference, "In the land of the blind, the one-eyed man is King." It was felt that choosing brand of equipment may have to become a faculty consensus.

LEADERSHIP TRAINING IN COMPUTER TECHNOLOGY WORKSHOP

SUMMARY OF EVALUATION FORMS

SEPTEMBER 21-23, 1984 - NEW ORLEANS, LOUISIANA

PART I:

Participants were asked to respond briefly to three general questions in part one. The response was positive concerning the conference, its value and effectiveness. Part II was an evaluation of individual sessions.

QUESTION 1:

Do you believe the objectives of the conference were met? Why or why not?
Participants generally felt objectives were met, knowledge had increased and that progress has been made. The sharing of information and the interaction of the group was a plus as was the size of the group. Of twenty-two responses, only three were negative and one of these responses ended with a comment that the conference was of value. The overall opinion can be summed up in a quote from one of the participants - "I feel knowledgeable and better understand my program's accomplishments, potentials, problems and needs."

QUESTION 2:

What do you believe should be the next step? Another conference, etc.
There were twenty responses to this questions, and all said some follow-up or next step was needed: another conference; a manual; continued sharing of information and interaction with others; a bank or registry of ideas that could

be tapped. Participants have the need to continue working on the problem of computer integration with assistance from the "outside" as well as from within their group of colleagues.

QUESTION 3:

Do you feel this workshop has given you insights into how to integrate computer technology into your curriculum? Explain

Of twenty-two responses, only one person felt that the conference had not given insights into computer technology integration. Most participants felt they had a better understanding of where they "are" in relation to where others "are." The need for integration of computer technology into individual courses was expressed, as was the need for faculty involvement in the integration process. The desire for a network of people to consult and the feeling that it was helpful to hear from other schools were expressed, in addition to the idea that there was a better understanding of what to look for and where to go for assistance.

Part II:

Participants were asked to rate components of the conference on a 5 to 1 scale with 5 denoting very useful and 1 denoting not useful. Mean scores ranged form a high of 4.47 to a low of 2.43. The "group participant" activities (Capsule Reports, Small Group Discussions, Software Demonstrations, and Hands-On Experience) ranged from 3.0 to 3.52, while the "lecture" activities, with two exceptions, were in the 3.30 to 4.47 range.

In general, participants felt the conference was useful and fulfilled some need or desire for information or assistance they had concerning computer integration into graduate curriculum.

The second workshop was a somewhat condensed version of the first. It was felt that we did not need to discuss the issues of change at that session. Things had progressed sufficiently by that time and people at the second workshop knew that change was necessary and they wanted to know how to go about it. They felt the workshop enabled them to see what others were doing and the direction which was to be taken. The result of both workshops was that the participants felt they had made some new contacts with whom to share ideas and plans...and they felt part of something instead of feeling alone. The very nature of Computer Technology and its affect on all areas of society is one of change and re-evaluation. The flexibility of this project in the change process was the main reason it was so successful. A sample evaluation form can be found in Appendix B.

LEADERSHIP TRAINING IN COMPUTER TECHNOLOGY WORKSHOP

SUMMARY OF EVALUATION FORMS

FEBRUARY 2-3, 1985 - NEW ORLEANS, LOUISIANA

PART I:

Participants were asked to respond briefly to three questions. The questions posed were the same as the ones used in the September conference. Responses were positive concerning the value of the conference particularly in that participants felt they could use the knowledge they had gained at their own institutions.

QUESTION 1:

Do you believe the objectives of the conference were met? Why or why not?

There were twenty-one responses to this question. Most participants felt that the conference had defined areas and issues and had given practical suggestions and new ways to implement computers into the curriculum. The participants expressed appreciation through the exchange of ideas and for having the workshop attached to the American Speech-Language-Hearing Foundation Computer Conference which provided them with additional useful information.

QUESTION 2:

What do you believe should be the next step?

The need for follow-up was expressed: annual workshops for updates, articles in the ASHA Journal, reports from participants in the form of a newsletter, and a list of who has what hardware/software. The ten most common problems/

activities and how they can be improved as well as the pros and cons of different systems were mentioned as a topic for follow-up. An inventory of participants and the directions they were taking in the future was suggested as a library of applications that could be available through a central resource. All twenty of the respondents to this question felt the need for follow-up.

QUESTION 3:

Do you feel the workshop has given you insights into how to integrate computer technology into your curriculum?

Respondents felt they had a clearer picture of what needs to be done as well as better ideas about how to manage software. They shared ideas of how to motivate faculty and students and how to make computers more accessible in their own institutions. Good insights were gained and the framework for analysing the needs of their own institutions were formed. Content of future courses and modules that could fit into existing curricula were formulated. Learning what other schools had done in terms of integration was very helpful.

PART II:

Participants were asked to rate components of the conference on a 5-1 scale with a 5 denoting very useful and 1 denoting not useful. Scores ranged from a high of 4.43 to a low of 2.74. The mean score was 3.77.

INFUSION GUIDE

A guide to facilitate the infusion of computer technology into the curricula of graduate level programs in Communication Sciences and Disorders and related fields.

This paper is the product of the third and final workshop help in May 1985.

INFUSION GUIDE

BACKGROUND

This report is the product of a workshop held at the University of Virginia in Charlottesville, in May of 1985, and a subsequent meeting in June at the ASHA National Office. The invited participants were chosen from the Leadership Training in Computer Technology workshops which were held in September, 1984 and February, 1985 in New Orleans. The authors are: Glen L. Bull, Ph.D., Associate Professor, Department of Speech Pathology and Audiology, University of Virginia; Paula S. Cochran, M.A., graduate instructor, University of Virginia; James K. Lang, Ph.D., Professor and Head, Speech and Hearing Research Laboratory, Brooklyn College of the City University of New York; Bruce R. Pierce, Ph.D., Chair, Department of Communication Disorders, Colorado State University; William Seaton, Ph.D., Director, School of Hearing and Speech Sciences, Ohio University; and Joseph J. Smaldino, Ph.D., Head, Department of Communicative Disorders, University of Northern Iowa. In addition, papers were submitted by Robert B. Mahaffey, Ph.D., Professor and Director, Division of Speech and Hearing Sciences, University of North Carolina; and Michael Chial, Ph.D., Associate Professor/Coordinator of Audiology, Department of Audiology and Speech Sciences, Michigan State University (Appendices D and E).

The goal was to produce a guide which would facilitate the infusion of computer technology into graduate level programs in the Communication Sciences and Disorders. The audience for this guide was to be program directors or others who were to be change agents with respect to this process of technology infusion. The tone was to be practical, non-directive, supportive and resourceful.

After evaluating the two Leadership Training workshops, it was concluded that there was a need for a cohesive written document if the project was to have a future impact on graduate programs. The purpose of this document is to provide a reference for ideas on how to further the infusion of computer technology. It is concise, generic in nature, and is written by university faculty who share their real world experiences.

It is hoped that this guide will be practical and useful to those who are interested in the infusion of technology into their curriculum, into their clinical practice, and their program management.

Joan Cooper
Project Director

INTRODUCTION

Purpose of this Document

Microcomputers are pervasive and will surely become even more so. "[T]here's little doubt that five years from now, the overwhelming majority of large corporations will be doing things quite a bit differently - and personal computers will be the reason" (Infoworld, May 20, 1985, p. 41). There is hardly a public school in the country that does not have one or more microcomputers, and most have several. Microcomputers are also being acquired in great numbers by institutions of higher education and they are being used in a wide variety of academic activities.

Times of change provide problems and opportunities. Some of the present applications of microcomputers may appear faddish several years from now; however, it is certain that microcomputers themselves are not a fad. It seems certain that they will affect our profession in significant ways. Computers and many of their applications are already being utilized in many graduate programs in Communication Sciences and Disorders. There is no doubt that they are here to stay, and that use of them will expand rather than stabilize at present levels.

Since this is a new technology for many of us, a guide to leadership characteristics in this area is thought to be worthwhile. The general purpose of this document is to attempt to provide such a guide. Our specific purposes are as follows:

1. To suggest kinds and levels of involvement specific to helping program directors and others develop leadership in this area.

2. To suggest means for effective integration of computers and computer competency into graduate curricula.

3. To suggest mechanisms for sharing and disseminating experiences and ideas in order to expedite the integration process.

Some comments are directed to those who presently feel intimidated, lost or alienated by the computer revolution. Other comments are directed to firmly committed computer users who wish some guidance about further steps they might take to increase the variety and sophistication of their usage.

As our programs prepare students to provide direct clinical services, we can enlist the aid of computers to enhance the cost effectiveness of service delivery and in the process enhance our image as a profession at the forefront of technology. Nothing about this commitment to computers implies that we must necessarily lose those humane qualities that enhance our effectiveness with clients or our joy and satisfaction in serving them well. We are committed to the belief that students will utilize computers well if we, as their teachers, provide good models with respect to both extensive and effective computer utilization.

Computer Applications

When the integration of computers into our professional education programs is considered, it is helpful to identify potential benefits and applications. Flexibility with respect to possible uses is the nature of the power of the computer as a tool. This flexibility distinguishes computers from other technological advances and from popular devices which have come and gone in our profession as well as in education. In a matter of moments (the time it takes to remove one software disk and insert another), a computer can change from a keeper of business records to a mode of instruction or an aid in therapy.

Computer as a Teaching Tool

1. Classroom Instruction

Computers can be powerful instructional tools when they are used appropriately and in an imaginative way in the classroom. They may be used to enhance many of our traditional classroom modes of instruction. Also, they may provide us with powerful new modes of instruction which we might not have imagined possible before having the experience of working with some of the applications software which is presently available.

A computer connected to a wide-screen video projector, for example, can be an "electronic blackboard." Audiometric simulators, voice analysis displays and language analysis programs can be used with an entire class at once.

The ability to simulate real world events and processes is one of the most fundamentally unique features of the computer and this concept of simulation can significantly facilitate instruction. For example, the settings of hearing aid controls might be quickly and dynamically changed, via computer simulation, with the acoustic output displayed for each control setting. Word processing or thought processing software might be used to simulate diagnostic report writing or lesson planning. These are techniques of instruction which would not be practical without the aid of a computer.

The ability to sort and manipulate data quickly is another unique feature of the computer which might be turned to innovative instructional use. For example, a data base of raw data about phonological and syntactic events, as a function of age of acquisition, might be provided to students with the assignment to sort these data in ways that would be useful to the diagnostic decision making process. Students would, at the same time, learn about diagnostic decision making and about data base management as it relates to their profession.

2. Individual Instruction

Computers are frequently used as individual teaching tools. Some software designed to be used as computer-assisted-instruction (CAI) is available for content related to our field. This software is primarily tutorial in nature thus far.

Another type of software was not, perhaps, designed specifically for instructional purposes but may be useful as a training aid. Software designed for individual client management (e.g., diagnostic test analysis, hearing aid selection, speech sample analysis, IEP writing) may be an effective individual learning experience for students. Software of this kind permits and encourages the easy and rapid change of variables, and, thus, the student is encouraged to produce a product of higher quality (in the same amount of time) than would have been feasible by conventional means.

Computer as a Clinical Tool

1. Client Management

Client record keeping can be simplified for clinicians through the use of basic database software. Computers can be used to track responses during a session, keep long-term progress records, produce graphs of therapy data, and facilitate progress-report writing. These uses might be categorized as individual client management.

2. Direct Intervention

Applications for effective, direct intervention with communication-disordered populations are being developed; the appropriate balance of computer aided therapy and more traditional approaches will require study and experience. It will be important for advances in this area to take advantage of the capabilities of a computer: its speed, animation, sound and color capabilities, and capacity for individualization and simulation.

Computers have already become equalizers for many multiple and severely handicapped children and adults, providing communication systems and vocational opportunities not previously possible. Hearing-impaired and motorically handicapped populations seem to have received the most extensive and effective attention in this regard. Computers can now be operated effectively by individuals with minimal motoric response capability. By combining the use of computers with electronic mail and bulletin board systems, severely handicapped people now have access to communication with the world community.

3. Clinical Research

The computer can be used to assist clinicians in taking data for research projects designed to enhance the cost effectiveness of clinical service delivery. In addition, the availability of several statistical packages for use on microcomputers may encourage clinicians to more routinely scrutinize clinical data for statistical significance. Also, the computer is being used for real time process control of clinical research projects which utilize equipment typically found in the behavioral research laboratory.

Computer as a Management Tool

Program management in any setting can be facilitated by computers, usually through the use of three basic types of readily available business software: word processing, data-base management, and electronic spreadsheets. Considerations for choosing hardware and software for these and the other applications mentioned will be discussed below. In many instances, the same hardware can be effectively used for both clinical and administrative purposes.

Acquisition, maintenance, and analysis of data for submission of reports to higher-level administration can often be accomplished more easily with computerized systems. Correspondence, form letters, mailing lists, grants, resumes, supervisory reports and administrative reports such as Educational Standards Board and Professional Standards Board accreditation applications are more efficiently managed by implementing these tasks with computers. Record-keeping functions such as student record maintenance, tracking students through their academic program, practicum-hour records, client records, and client billing are all functions that can be managed effectively with computers.

Computer as a Research Tool

Aside from statistical packages, microcomputers offer other research-related benefits. They can, for example, be interfaced with laboratory instrumentation to control stimulus presentation or record data in real time. Development of speech and language sample analysis software may broaden the scope and increase the reliability of research previously dependent on lengthy analysis-by-hand.

Summary

The possible uses of computers in the field of Communication Sciences and Disorders are wide-ranging due to the extreme flexibility of the computer as a tool. Computers have demonstrated potential for directly and indirectly enhancing instruction, research and delivery of services to our clients and our students. There is a need for leadership among program directors and faculty for the effective integration of computer technology into graduate education programs.

Faculty should be encouraged to experiment and develop new ways to include the use of the computer within curricular offerings. Some education programs have adopted a separate course or courses dealing extensively with aspects of computer applications. Others are integrating computer usage into existing courses. Many programs are trying both approaches.

Word processing is one of the easiest uses to incorporate. Students may be allowed to complete reports on a word processor as part of their coursework. Curricular offerings which require report writing, term papers, lesson plans, annotated bibliographies, etc., are excellent candidates for this strategy. Once they are introduced to word processing, students are likely to identify suitable applications above and beyond requirements. Other strategies for the effective integration of computer technology into graduate education programs are discussed below.

STRATEGIES FOR INTEGRATION OF COMPUTERS INTO THE GRADUATE LEVEL CURRICULUM

General Considerations

In considering strategies for integration, it would seem useful for program directors to reflect on the broader context in which communicative disorders programs exist and to review their program with the intention of determining program and personnel strengths in order to build on these strengths. When doing this, it would seem useful to keep the following in mind:

a) **The use of computers is not a goal unto itself.** The very real benefits of computer technology will be realized if the special and even unique features of computer technology are sought and creatively utilized in the service of our profession.

b) **Identify individuals who have already demonstrated an interest in learning about and using computers in some capacity related to our profession.** These will possibly be the most receptive persons with whom to work initially. Moreover, they will help to arouse the interest of others and serve as resource persons who can aid others who will become interested.

c) **Of those who do utilize the computer, expect various levels of sophistication among them.** For example, some may incorporate a wide variety of computer-based applications while others may be limited to just a few.

d) **Identify a primary change agent who can devise a plan to initiate infusion of the technology into the curriculum and other aspects of the program.** Ideally, this individual would also devise a plan for at least short-term growth beyond the entry level stages.

This individual who is to be the primary change agent need not be the program director; but, s/he will have to be sufficiently competent and given the appropriate balance of authority and responsibility requisite to completing the job effectively.

This individual need not be someone with a broad background and years of experience (though it would be ideal to find such a person); but, the novice cannot lead the novice in this aspect of technology, and this person may need time to acquire more sophisticated levels of competence.

The personality of the change agent should be such that s/he can train and motivate others to develop the ability to learn to work independently. For a program to remain viable in this area, it is necessary for it to have several individuals using this technology effectively.

e) **Professional competency is not tightly linked to computer competency.** Even so, an implication of this document is that at the program level, a program that does not adequately train students for this technology may place graduates at a professional disadvantage.

f) **It cannot be assumed that, just because students and faculty are not using computers, they really don't want to use them.** It may be that they have not had the opportunity to identify the benefits from using the device in their professional lives. And, it is wise to be aware that the discovery of these benefits may come only after significant exposure and experience.

g) **There are several aspects of competency:** competency with applications software (word processing, data base management, spread sheets, clinical software, et cetera); competency with the writing of software programs; competency in connecting computers to augmentative, assistive devices. These aspects of an individual's competency interact and facilitate one another. The more you know, the better. But, each individual has to start somewhere.

Leadership Strategies

As a program director considers how his/her program fits into the broader context within the college and university environment, a consideration of strategies for cooperation might be of great assistance in achieving greater computer usage among program faculty. **For example, the program director might provide leadership in promoting or establishing college or university-wide computer technology committees.** These committees could be useful in fostering a "computer culture" in which goals and user's groups could be established. An additional benefit from such a committee could be enhanced faculty cooperation in the form of shared knowledge, resources and support.

By placing the communicative disorders program in the context of a broader-based committee structure, one may discover new opportunities for certain kinds of "trade-offs." For example, a communicative disorders faculty member might have a skill or expertise in a particular area such as hard disk technology. That knowledge could be given to another program within the same institution in exchange for knowledge in a needed area such as interactive video technology. Finally, establishment of such a committee would ensure faculty participation in the decision-making process.

Another broad-based strategy that a program director might consider is coordinated or cooperative requests across collegial units for the purchase of computer equipment. Upper-level university administrators are less likely to listen to requests for such equipment from a single program. However, a proposal from two or more programs for a joint project (such as a computer laboratory to be used by several programs) would have a better chance of receiving approval.

Communicative disorders program directors are in a unique position to influence the direction of the field for years to come. Perhaps the most important and fundamental commitment they can make to ensure success for integrating this technology into their curricula is a commitment to fostering a nurturing environment. By this is meant that the program director needs to encourage faculty members with an interest in this technology with specific actions. These actions might include the purchase of computer hardware and/or software packages for use by interested faculty.

Some institutions have devised computer loan programs whereby faculty are allowed to develop computer interests and skills at their own pace and in the environment of their own choosing. Another action might be the diversion of some continuing education or travel funds to permit interested faculty to attend workshops and conferences in order to broaden their computer skills and be exposed to other hardware and software than those available locally.

Support for the little things also goes a long way toward encouraging the use of computers. For example, budgeting sufficient funds for supplies such as computer paper, printer ribbons, new software packages and updates, subscribing to several computer magazines and establishing a local computer reference library, all represent supportive efforts that encourage faculty to sustain use of computers.

The program director can exercise leadership by becoming a "lobbyist" to the university administration. Efforts to promote the use of computers and encourage support for faculty activities in this area are critical to establishment of an adequate and continuing funding base. Because of the rapid technological improvements and therefore the need to refresh and update faculty skills and provide additional equipment, the lobbyist activity should be considered an ongoing process.

The program director can also be patient and understanding of the commitment necessary to develop computer competency in the faculty. Primary among these is a sense that false starts are not only acceptable, but expected. Faculty will try to develop areas which turn out to be unproductive and/or have no immediate utility. The process used and the knowledge gained by the faculty member during these false starts is valuable and should be recognized as such.

A corollary to this principle is that sometimes faculty progress during development may be very slow. An element of patience is very important here. As with any complex learning process, the learning curve is not flat. There are times of very slow progress. Penalties during these times will serve to further delay the learning process or even abort it. The program director can serve as a catalyst during these times by providing encouragement, and resources such as technical support and/or advice.

Finally, the program director may have to make some difficult decisions in order to speed the implementation of computers into the graduate curriculum. One of these relates to prioritization of limited departmental equipment fund allocations. A high priority for computer hardware/software purchases may have to be established. These will have to be reconciled with desires of the faculty

for traditional kinds of equipment and materials. In some instances supplemental funding may have to be obtained through grants, special supplemental equipment allowances and/or use of departmental clinic fees.

The program director might demonstrate leadership by providing a good computer competency/usage role model for the rest of the faculty. This will involve development of a certain degree of enthusiasm for computer competency. However, the enthusiasm is not enough. Hard work will be required of the program director in order to develop this kind of competency. The faculty must be made to understand that this will demand time and require a diversion of some funds to the director for hardware, software and related computer supplies. During this development, faculty patience will be required, the learning process may be slow at times, and the promised computer implementations may not appear on schedule. False starts may occur here, too.

Groundwork for a climate of understanding and patience necessary to attain computer competency should be established prior to the event. Such an experience on the part of the program director will provide insights as to support that can be provided other faculty to develop computer competency.

Since it is believed that motivation for computer competency stems from a perceived benefit to the user of the competency, program directors often derive the most immediate benefit from implementation of computers in the area of program management. This is the most likely area in which to begin the modeling process.

The program director can expedite the acceptance of computer competency as a legitimate enterprise. Faculty will tend to embrace the time and effort commitments necessary for computer competency if they can clearly see how that time and effort will be rewarded. The program director may again play the role of lobbyist by incorporating these activities into standards for promotion, tenure and merit considerations.

Experience has shown that faculty acceptance and development of computer competency/usage can best be expedited by a knowledgeable colleague to act as a resource to the rest of the faculty. The program director can provide leadership by identifying the faculty member by virtue of such characteristics as motivation, already established skills, enthusiasm, and the ability to clearly share technical information as the most promising candidate to fill the role of local consultant. This person might then be given release time, the person's academic load might be temporarily shared by other faculty, and departmental funds might be expended preferentially to support the development of the resource person. A critical need here is the understanding and support of the faculty for such an individual.

Encouragement of an element of healthy competition may be a useful strategy for program directors to use in order to hasten the involvement of reluctant faculty. Incentives in the form of additional travel, merit monies, and computer-related equipment might be used in this way.

DISSEMINATION OF INFORMATION AND HELP

Getting Started

If your program has not already started, you are behind. But, there are now others who have blazed some trails you might find useful to follow. The section of this guide titled "Purchasing Hardware and Software" is designed to give specific assistance. In this section, the intent is to deal with the reluctance, the fear, the inertia that some feel when faced with change and especially when faced with change which will require some really hard work and a significant time commitment. Many school children who are growing up today will learn computer technology as easily and as naturally as others learned about telephones and typewriters. The rest of us, who wish to catch up, simply have to carve out of our busy lives the time and the energy to do it. It would be misleading and dishonest to down play the nature of the commitment required.

Finding a consultant may help (see the section on Locating a Consultant); but, if this is not feasible and you have to strike out on your own, then read on.

a) If you have not started you will have difficulty getting others started. So, the most important step of all is simply deciding that you will, somehow, make a commitment to learn how to use a computer. If you cannot do this, then some change agent will have to be found who can do so.

   Spending too much time deciding just how to start may defeat you. Dive in. A few simple principles will guide you away from any very serious, costly errors. Think of it this way: "SHOOT, ready, aim."

b) Purchase a computer which is popular (see "d" below) in your profession and, especially, purchase the computer that a helpful and nearby person has; i.e., someone who can help you.

c) Purchase some applications software that is likely to be as broadly useful to you as possible in both your professional and personal life. For most of us, this is word processing software.

   Select very popular (see "d" below) software. Also, it may be folly to select software which is too simple. That which is quickly and easily learned may be quickly outgrown. Even a very complex word processing program can be initially learned at a simple, easy level. Then when you are ready to do so, you can move on to some of the more challenging aspects of the same program. Why have to re-learn beginning skills in a whole new program simply so that you can go on to more complex features?

d) One way to gauge popularity is to go to the computer section of some book stores and look for books about brands of computers and for books about common applications software (such as word processing). Authors

do not write books unless they know that there is a large market of persons who own particular brands and models of computers or particular software products.

Authors write these books for the benefit of readers who may find that they do not care for the instruction manual that came with the computer or the software. Thus, some of these books may be very useful to you when you are finally ready to sit down in front of your computer and your applications software.

e) If you initially select applications software such as word processing, see if you can get the dealer or a friend to help you set up your system so that computer, software and printer function together properly. This is sometimes called "configuring" your applications software to your hardware. It is likely you will want to know how to do this eventually; but beginners, naturally, want to get started quickly and with as little confusion as possible.

f) Do not worry too much about advancing technology and about obsolescence of your computer. Do not be too eager to wait for the better products and lower prices that may be available tomorrow. You could wait forever, and while you are waiting, your own knowledge and skills simply slip farther and farther behind. The obsolescence which may be of greatest concern is your own.

g) Plan to use your computer first for familiar tasks. Again, word processing is a good, first choice. Coping with the newness of the technology will be more easily handled if the task is familiar; but, do not be surprised if there is some negative transfer. You are learning new ways to do familiar things.

h) Unless you have the guidance of an excellent consultant, it will be best to start with modest expenditures. Purchase one computer, or one for each person you are confident will actually use it. Do not mix brands initially. Stay with one brand until your experiential base grows.

Do not be too eager to purchase many different types of applications software. While you are learning one or two, the others will be sitting around becoming obsolete. If your time is limited, it may be quite a while before you become a person with a broad base of experience.

This guide is being written in the spring and summer of 1985 and now is not to soon to acquire computers for your program if you have not done so already. There is a very strong base of the Apple II series in the public schools (approximately 70%), and this is unlikely to shift dramatically over the next four or five years. By the same token, the business community seems to be locked into IBM and IBM-compatible machines. For both of these, the hardware has somewhat stabilized and it is unlikely that the microcomputer you

buy tomorrow will become seriously obsolete in the near future. But before you start planning for a really major purchase, you need to identify some initial goals. A consultant can help with this task.

Locating a Consultant

The best way to get started is to talk with someone who is doing something with computers that is similar to what you want to do. This probably means that your best source of information will be someone from another speech and hearing program. Consultants from your institution's computer science program and local vendors can help with technical problems, but they may not be familiar with specific applications in communication sciences and disorders. And, consultants from the former areas may be intimidating while those from the latter may have vested interests related to the products with which they are familiar or which they are selling. They are sometimes called "SEEs" (Single Equipment Evangelists).

A consultant from another communication disorders program can help clarify how computers can fit into your educational program. Conditions at the consultant's program will, however, almost certainly be different from yours. The consultant's program will probably be richer in resources, while your initial needs may be more modest.

The consultant may make recommendations on:

a. selection from among computer brands and models
b. commercial software packages
c. peripherals (printers, modems, monitors, speech synthesizers, etc.)
d. operating, maintenance, and replacement costs
e. staff training
f. space, installation, accessibility, and security
g. planned growth
h. computer applications that work, and ones that don't.

Many of the consultant's recommendations may parallel the ones that you would have made. A consultant can provide, however, an objective second opinion and can, perhaps, strengthen your requests for support. The cost of the consultant is small in comparison with the potential cost of mistakes that might otherwise be made.

After the Consultant Has Left

When the consultant leaves, the initial burst of enthusiasm is often followed by a letdown. Things sometimes don't work the way they did when the consultant was there. At first, using a computer can take more time, not less. For example, formatting a blank disk may take two hours the first time, and 60 seconds thereafter. This is typical and should be anticipated.

When difficulties with hardware or software crop up, the manual can help. It is even better, however, if you have access to someone in the local

community who uses the same software package. That person may be able to tell you how to make your software work with an XYZ printer in five minutes, rather than the five hours or five days it might have taken you to research it and solve the problem.

Computers & Computer Cultures

Informal Learning

Manuals are essential references. Guard them carefully and keep them in a secure place. Manuals, however, are not the only or even the best way to learn about computers. The best way to learn about a computer is from someone who already has the same kind of system you have. They will have learned from mistakes, and will know some of the idiosyncratic behaviors of the system. They may even know short-cuts the manual does not mention or does not stress.

When the information is useful, students will share it and help one another. If students are allowed to use word processors for papers and clinical reports, it may only be necessary to show a few students how to use a word processing program. They will show all the rest.

Formal Courses for Students

In addition to informal networks among students, more formal training elements can also be added to the curriculum. Some programs integrate the information into existing courses, while others offer an initial course that at least provides introductory information. In some programs, both approaches are used.

The consensus seems to be that these courses are best developed and offered in the home department, rather than in the business or computer science divisions. Courses in those divisions typically are not designed for students in communication disorders, and they find it difficult to make the inductive leap from science or business applications to those of our profession.

A Training Program for Faculty and Staff

Training programs for faculty are necessary too. Without provision for training, microcomputers make the world's most expensive paperweights. If you are in the process of learning about microcomputers and their applications in communications disorders, you can create your own self-study program which would perhaps be eligible for ASHA continuing education credits.

It will also be necessary to provide training for staff. Some universities offer training programs in business productivity tools (word processing, spread sheets, and data bases) for secretarial staff. One of the fastest ways for a secretary to learn a word processing system is to place a word processor on the desk and provide training in its use.

Establishing a Departmental Laboratory

Some universities have microcomputer laboratories which are available to all departments. If you establish your own departmental microcomputer laboratory, it may be important to think about efficiency of information transfer as well as efficiency of space.

A microcomputer laboratory divided into cubicles tends to restrict the flow of information between users, while an open laboratory encourages information transfer. Placing two chairs in front of each workstation is also a useful strategy, encouraging beginners to work together.

Many departments choose to establish an open laboratory for students and a second lab area for faculty and advanced graduate students. Faculty who enter the open lab are quickly inundated with questions. The optimal situation, of course, is to ensure that each faculty member owns a microcomputer.

You Are Not Alone

User Groups and Newsletters

In many areas user groups are an unrecognized resource. Their existence is often unnoticed, but they are frequently the only source of obscure technical information. This can be an advantage if, for example, you want to hook up a serial computer interface to a printer which accepts only parallel input.

The local vendor of computers and software can be another resource. Some universities have state contracts, or are forced to use competitive bidding systems which do not consider the factor of local support. In those cases, support from the local vendor may not be an option. If you are able to make purchases locally, remember that the number of computer stores increased from a few dozen to several thousand in the last decade. However, several thousand highly trained experts did not magically appear to staff these stores, and your salesman may have been selling shoes last year. "Test the waters" first by asking a few questions to which you know the answers.

Other excellent resources are: a) books that relate to your brand of computer and to your particular software products, and b) computer magazines that are also specific to your hardware or your applications. In addition to magazines found on the newsstands, there are a number of newsletters specific to particular machines and software packages. These newsletters are not as well known as periodicals with larger subscription bases, but they are an excellent way to locate others who have the same interests you have.

National Networks

Your microcomputer can access information on larger computer systems across the nation. The two best-known general information services are CompuServe and The Source. In addition, there are specialized services such as Special-Net, a part of the National Association of State Association Directors of Education, designed for special educators.

A microcomputer, a modem, and a software communications package are needed to access these services. The modem is connected to the telephone line, and through it your computer can access virtually any other computer that is reached by telephone. Modems come in two speeds: slow - 300 characters a second (300 baud) and fast - 1200 characters a second (1200 baud). The very high speed (2400 baud) modem should be avoided until there is wider support for its use; i.e., until equipment and communication protocols are more standardized. Slow modems can be purchased for less than $100, while fast modems may cost $300 or $400. Software communications packages cost between $35 and $200. Some telecommunications software packages are in the public domain, and can be obtained at no cost or very little cost through users' groups.

Most of the commercial networks such as Compu-Serve charge a subscription fee to support their services. Typically, a connection charge might be $6 an hour during off periods and perhaps twice that during peak periods. In addition to the commercial services, there are a number of public service bulletin boards which can be accessed for no fee. Often, when you have access to one bulletin board the names of many others will be supplied. Users' groups can give you the names of some in your area.

Someone can show you how to use a telecommunications package in half an hour or so, although it may take longer to explore the full range of possibilities. It is not generally realized how easy these systems are to use. Yet there are almost as many benefits from telecommunications as there are from word processing.

The national electronic networks can be used as electronic mail systems which allow you to transfer a recommendation or the draft of an article to anyone in the country who also has a microcomputer and a modem. They also are a very useful source of help. You can leave questions on the electronic bulletin boards supported by these systems, and the chances are that someone else will have the answer to your problem.

Local Support

An electronic bulletin board offers a way for clinicians in a community to share information whether they are particularly interested in computer applications or not. A bulletin board can be created for the cost of a computer, a modem, and a bulletin board software package.

Most school systems have a computer, and a modem can be added for less than $100. This provides a way for clinicians to share information with others who have a similar system and do so in a way that is faster than a monthly newsletter. This method of communication does not interrupt a clinician in the therapy room the way a phone call does. The rapid turnaround of information can also provide closer ties between the university and the school system.

This sort of system can actually alleviate problems of users who wish to communicate with other users who have seemingly incompatible computers. It allows a person to work at home or at the office to create a document they wish to send to another person (via computer and modem) and effectively do this even if the other person has a different (incompatible) system. When a file of one's own work is ready, it can be transmitted and stored temporarily in a bulletin board computer. Later, other users may use their own computer and modem to order that the stored files be transferred to their own system. As the material is stored in the new system, its format is changed to the format needed by that system.

PURCHASING HARDWARE AND SOFTWARE

Bases for Choices

The bases for buying hardware and software are as much sociological as they are technological.

1. Popularity

The most important consideration in purchasing a system is popularity. Quality is certainly a factor but marketing a high quality product does not assure that a company will stay in business or that every high quality model they market will become popular.

Be aware that authors of software do not write sophisticated programs for limited markets. Therefore, don't try to be a maverick and a beginner at the same time. Join the crowd. Buy into the brands and models that have the largest installed user base. Also, the more people who buy a system, the easier it will be to find someone who can answer your questions.

Popularity of software or hardware also leads to increased third-party commercial support. Countless numbers of books have been written about several popular word processors. These packages tend to be error free because those who have used earlier versions have found the errors which have been corrected.

2. Vendor Support

Vendor support is another important factor. If you are not allowed to make purchases from local vendors, this is not an issue. Sooner or later, every system breaks down.

Ask the vendor for references. If he can't produce five satisfied customers, you don't want to become the sixth. On the other hand, good vendor support may be one factor in the purchase of less popular systems.

3. Product Reviews

There are a number of services which review consumer computer products. It is no longer necessary to buy products blindly.

Not all product reviews are equal. The product reviews in Infoworld are rigorous, although the package may not be reviewed from your perspective. For example, software cannot receive an excellent rating in the area of documentation unless the package has on-line help. If you prefer to use a manual, that may not be important.

On the other hand, you will never find a poor rating of a product in some popular journals. A sore issue is the fact that these journals are

dependent upon the revenues from the manufacturers of the products they review. Reviews in this type of magazine may be useful for getting a sense of what a package can do, but read them with caution.

One of the best sources of evaluation of education products is EPIE, a nonprofit organization. A subscription is approximately $60 a year, or you may find it in your local education library. There are a number of software directories specific to communication disorders. At present, most of these provide product descriptions rather than evaluation.

4. Compatibility

A final consideration in software and hardware selection is compatibility. If your entire university is committed to a particular product, this may be the most important consideration of all. Even if the choice turns out to be a bad one, at least you have some one else to blame.

When the compatibility question is considered, keep in mind that not all software can run on all machines. This is particularly true for specialized software developed specifically for communication disorders. If you want to use a particular software application, this may influence the machine you decide to purchase. It can also provide the rationale for purchasing a system other than the one mandated by the state or university.

5. Supplements to the Manual

A good way to shop for either hardware or software is to browse in the computer section of bookstores. Are there books available that describe beginning or advanced use of the products you are planning to purchase? Some of these books will be helpful, some not. But, the existence of many titles is a tip-off about popularity of the products you are considering. And the books themselves can be helpful. Reading the descriptions of two or three different authors on the same product or procedure can be significantly more helpful than reading just one; i.e., get some other opinions and perspectives.

Additionally, there are computer based training programs that teach how to use both hardware and software products. For example, purchase a computer based product to help you learn a more advanced program. There are two benefits: you gain assistance in learning to use the product and you get experience with the concept of computeraided instruction.

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REFERENCES/RESOURCES

Closing the Gap Newsletter
Closing the Gap
P.O. Box 68
Henderson, Minnesota 56044

CUSH Journal
Journal for Computer Users in Speech & Hearing (CUSH)
William H. Seaton, Editor
Ohio University
Athens, Ohio 45701

EarNet
Offered as a free service by AND-OR Corporation (supplier of audiometric testing equipment, Charlie Anderson, owner), an electronic bulletin board that can be reached at (303) 232-3217.

Linc
Linc Resources, Inc.
1875 Morse Road
Columbus, Ohio 43229

Medline
Medlars Managment Section
National Library of Medicine
8600 Rockville Pike
Bethesda, Maryland 20209

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STG Editor
John Wiley & Sons, Inc.
605 Third Avenue
New York, New York 10158

SpecialNet
National Association of State Directors of Education
2021 K Street, N.W., #315
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STUDENT COMPUTER FACILITIES: A GUIDE TO STRATEGIC PLANNING

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INTRODUCTION

Not only can computers help do important jobs faster and better--they also can reveal new and creative ways to foul up almost anything. Of course, most of the really impressive mistakes are only amplified by computers, not created by them. The present author, though not alone in this insight, has managed to discover some highly effective ways to waste resources at the altar of technology. These experiences have lead to a growing list of hints about how to consistently make dumb mistakes (e.g., buy stuff with bad documentation, deal with companies that go broke, use prayer as an interfacing technique, etc.). This article is intended to help others avoid this kind of creativity, at least with regard to computer facilities intended to support professional preparation in communication disorders.

CHARTING A COURSE

Strategic planning is problem solving by avoidance: a way of approaching problems so as to avoid entirely the need for tactics (i.e. reactive problem-solving). Strategic planning of student computer facilities requires attention to (1) program goals, (2) marketplace issues, (3) operational issues and (4) error avoidance.

A first task in strategic planning is that of establishing an overall direction relative to the degree of technological sophistication to be sought by the program. At the lowest level are relatively simple goals such as "keyboarding" skills, technical nomenclature, and operational understanding of garden-variety "productivity tools" (e.g., word processing and spreadsheet programs augmented by field-proven user-support materials). A second level (which presumes the first) includes operational understanding of software tools designed for applications in communication disorders, i.e., tools whose substantive content is a major focus. A third goal level adds skills related to the use of computer operating systems, problem analysis, programming, and the systematic evaluation of software offered for (or applicable to) professional purposes. An even more sophisticated level is that of designing and testing new systems (hardware, software, or both) for professional applications. Clearly, these four levels demand different resources and will result in different student "products."

The majority of academic programs will be most comfortable with the first two levels of this "sophistication" continuum; a small number will pursue more demanding goals. The point is, programs should determine where they are and where they wish to be relative to this continuum. This determination should be made <u>before</u> undertaking a program of "computerization."

Once an overall direction is defined, more detailed goals can be developed. Relative to the use of computers by professionals for professional purposes, at least five goals can be identified. Considered in terms of change they are: affective gain, performance gain, behavior gain, information gain, and cognitive gain. "Gain" is an increase in some desired characteristic of learners.

Affective gain (positive change in attitudes about the technology or about the tasks accomplished by that technology) can be assessed directly or indirectly, but is typically an incidental benefit of other gains. Performance gain can be measured by changes in efficiency (time rates of task completion) and effectiveness (the quality of task outcomes). Behavior gain can be indexed through changes in the frequency of successful, independent use of the technology to help solve problems. Information gain can be assessed as increases in demonstrated knowledge about both the technology and the professional problems to which that technology is applied. Cognitive gain, the most difficult to measure, is a change in the way problems are conceptualized as a result of an understanding of the limitations and strengths of available tools (see Kent and Fair, 1985). One index of cognitive gain is the frequency with which new solutions exhibit or employ the unique features of computers (e.g., the ability to independently manipulate content and form). Given a general direction and pertinent goals, agents of change can define specific behavioral objectives. A strategically well-planned effort will identify indices of effect (and criteria for success) as part of goal-setting.

Of course, things are not this simple. It is also necessary to wrestle with problems such as the differences in preferred learning styles of individuals, the press of other duties, and the incidental costs of program and instructional development. Of particular concern in technological areas are trade-offs between simplicity and flexibility (the two are inversely related) and between stability and change (we want the first, but we get the second). One critical and somewhat disquieting issue for planners is whether to focus on the technology of today (i.e., yesterday) or tomorrow.

MARKETPLACE ISSUES

Some academic programs have ready access to computer facilities appropriate to program goals. Others may find it necessary to acquire new hardware. New equipment should be specified in consideration of the overall direction and particular objectives of the unit. Chial (1984) and vom Saal and colleagues (1984) discuss hardware and hardware acquisition. Depending upon local needs and resources, it may be appropriate to seek assistance from consultants. Competent consultants freely admit the limits of their expertise. Remember, you get what you pay for.

SELLER STRATEGIES

Sellers and buyers of computer systems employ different strategies because they have different goals. Manufacturers and sellers of computer products have developed several strategies to further their objectives.

These strategies are not illegal, immoral, or even contrary to the interests of buyers. They are simply paths to survival in an increasingly competitive market.

1. The "bundling" strategy is one in which hardware and software are offered only as an integrated package, thus forcing acquisition of some hardware or some software that may not be useful. Very often, this strategy is supported by claims about compatibility, simplicity, optimized design, and "turnkey" operation. Some of these claims may be true; many are not.

2. The "continuing sale" strategy is one in which costs for minimal "start-up" systems (hardware, software, or the two together) may be low, but where the costs of the additional components required to make the system really useful are high. In the area of hardware, this strategy becomes ineffective when "second-source" suppliers enter the market. In the software area, periodic improvements (minor updates and major enhancements) are issued by developers at costs ranging from nominal to significant.

3. The "low cost" or "sale price" strategy by which a manufacturer or vendor may dump items soon to be discontinued. The future of such items is dim because they will attract only scant second-source attention; manufacturers may support these products for a time, but seldom with much spirit.

4. The "brand name" strategy is based upon the general reputation of the seller. Success with prior products, groups of users, or class of applications does not guarantee success with new ones, yet it is common for new products offered by established firms to attract thousands of sales solely on the basis of a product announcement.

5. The "product familiarity" strategy asserts the merits of systems on the basis of general popularity. Although that popularity may be well-justified, and although it may produce much activity among second-source developers, adequacy for general applications does not necessarily equal adequacy for specialized applications. One way to create product familiarity is to place systems in schools, colleges, and universities at very low cost. The students who use those systems graduate to become potential customers.

6. The "vertical market" strategy is typified by claims to offer all desirable computer-related services (i.e., from "top to bottom") to a particular profession or work-setting. This is an effective sales technique because it causes the buyer to stop looking. Common in industry, this strategy will become more so in the professions.

7. The "state-of-the art" strategy rests upon buyers' fears about obsolescence and the need to maintain a competitive advantage (true in colleges, too). Successful manufacturers combine this strategy with others (e.g., brand names) to maintain market dominance and an element of excitement about their products. This strategy is really no different from the "new and improved" technique for selling soap.

8. The "it'll be ready any day now" strategy results from advertising campaigns that get ahead of hardware and software engineering developments. Competition is so great that even the intent to market a product may favorably influence cash flow and stock prices.

9. The "free" strategy has become highly sophisticated and is quite effective. In one form, "free" software may be bundled with hardware; in another, "free" strategies are common in software marketing. One of these (a good one for many buyers) encourages users to "copy it and give to all your friends." If users like these programs, they can purchase updates as they are issued. The other software strategy entails selective distribution of "free" software as a way to conduct inexpensive field tests. A hardware variation, "free for a while," recognizes that once users become dependent on a system, they will move mountains to retain access to it. Nothing is free. Ever.

BUYER STRATEGIES

Buyers can promote their goals by being aware of seller strategies and by adopting strategies of their own.

1. Analyze the problem in detail. Begin by identifying the form, format, and quantity of data to be input, manipulated, and displayed by computer. Consider how often and how rapidly these things must be done. It is naive to assume that one model of computer will equally serve needs in administration, clinical service delivery, instruction, and research. What may be ideal in one area, may be quite inappropriate in another. One size does not fit all.

2. Attend to who will use the system. Some users will directly interact with systems; other users will relate to systems only as recipients of the products of systems (letters, reports, data). Direct users differ in a host of ways: some type, some don't; some read instructions, others won't ; some are willing to experiment, others must be led by the hand. Direct users are learners, too: what seems "friendly" to a naive user may become downright irksome six months later.

3. Attend to who will maintain the system. Except for very new products, hardware quality control is generally good. Quality control of software is more irregular ("there's always one more bug"), resulting in frequency modifications. Even if software updates are "free," someone must track and implement revisions. Disk drives must be cleaned periodically, paper and printer ribbons must be replaced, disks must be prepared for use, backup copies of programs and documentation are needed, and working copies of disks must be organized. None of these tasks are difficult, but they all take time.

4. Survey the market to discover the significant variations among products and dimensions of quality. Consult information sources (magazines, experienced users, advertising materials, college computer centers), but be mindful of vested interests. Be wary of

"missionaries" whose enthusiasm about particular hardware or software may be quite sincere, but at the same time quite irrelevant to your needs.

5. Try it before you buy it. This applies to both hardware and software and is the best defense against the "it's almost ready" ploy. Be somewhat skeptical: if you haven't seen it work, assume that it won't.

6. Don't buy the first one of anything. Most new products (hard or soft) contain flaws that may take weeks to discover and months to correct. Unless you really enjoy this kind of detective work, let someone else do it. Stay with proven products.

7. Don't worry too much about "state-of-the art." By definition, no commercially available microcomputer is really state-of-the art. The same is true of operating systems, hardware add-ons, and most application software. Technology is as changeable as the weather. More important is the idea that no system is obsolete if it serves your purposes.

8. Do worry about system integration. Be mindful of compatibility issues (hardware to hardware, software to hardware, and software to software) and the fact that some claims about compatibility are more hope than demonstrated fact. Perceived needs grow with experience and systems grow to meet needs. Such growth should be anticipated. One way to deal with compatibility problems is to buy everything from one supplier, trading risk for cost. Another is to make functional performance a matter of contract: pay for it after it works.

9. Do budget learning time. As fun and helpful as contemporary computers can be, it takes time to turn them to productive service and to define limits of performance. Sometimes experience shows that the limits of a system are too narrow for a particular purpose. Even when such "mistakes" occur, what has been learned can be transferred to other systems. The technology will change, but computers will be with us for a long time.

A final note: it may be necessary to put off decisions about hardware and software alternatives, but failing to act is also a cost. Temper prudence with a dose of existentialism. "Perfect decisions" are about as common as perfect automobiles: assuming access to competent advice, disasters are unlikely. Understanding follows commitment.

OPERATION OF STUDENT COMPUTER FACILITIES

Small computers are inherently decentralized resources, yet their management requires some centralization of effort. Success in managing student computer laboratories or work areas is more likely with appropriate planning.

1. Plan the work site. Provide enough space for the equipment, for the people who use it, for the way people use the equipment (as

individuals working alone, as groups working together), and for expansion. Plan desk space for user comfort and the inevitable paraphernalia of small computers (manuals, pencil-paper work, printer paper bales, etc.). Provide for safe (i.e., theft-proof) storage of manuals and program disks, as well as hardware. Work sites should be both accessible and secure (avoid first-floor locations in high-traffic areas).

2. Plan to maintain the facility. Provide adequate ventilation and adequate conditioning of electrical power lines. If possible, backup critical equipment (e.g., disk drives) with spares. Always hold original copies of software in a location inaccesible to routine users. Plan regular maintenance and cleaning of hardware (disk drives, keyboards, printers, display screens) and see that it is done properly. If your facility uses hard disks or other large-capacity storage devices, see to the regular purging of files. Anticipate the "retirement" and replacement of hardware. Include a budget for software additions.

3. Protect your investment. Track hardware by keeping your own inventory, location, and service records. Track software through a check-out system or some other means. Document usage of hardware and software. For single-user microcomputers, an excellent technique is a pencil and paper log book. This information can facilitate maintanence, index the success of the program,and support future planning.

4. If you must have programming done, learn how to manage programmers. This is not the easiest task, but it can be mastered in four simple steps. First, learn how to write programs. You really don't have to become proficient, but if you skip this step entirely, you will be at the mercy of every self-taught, 18 year old programmer in town. Second, learn how to specify programs in terms of inputs, outputs, and the functions of intervening operations. Input and output specifications require attention to the form, format, and quantity of data, as well as attention to the people who provide or receive those data. Third, insist on proper programming style: simplicity and clarity of structure, modular design, a standardized line-numbering scheme, and copious comments imbedded in source code. Fourth, demand good documentation. This is the major shortcoming of most "home grown" computer programs. Good documentation anticipates the user (both novice and experienced) and future software maintenance. Self-paced texts such as that by Brown, Finkel, and Albrecht (1982) are relatively painless ways to learn about programming. Campbell (1984) discusses program design in relatively non-technical terms independent of any particular programming language. Nevin (1978) gives excellent suggestions for writing style in BASIC. Grimm (1982) offers sound advice to technical writers of manuals for "serious" computer programs.

MISTAKE AVOIDANCE

Avoiding the plentitude of errors possible with student computer facilities is no easy task. Several authors (Kieras, 1981; Mayer, 1981, Balsam and colleagues, 1984; vom Saal and colleagues, 1984) have bothered to document some of their experience. This wisdom (and some based upon the failures of the present author) can be distilled as follows.

1. Don't worship at the altar of computers. They are just tools--no more, no less. Their value lies in what they can be used for, not what they are. Table 1 exemplifies this for the case of research. The table lists a variety of tasks and special-purpose tools. Each of these tasks can be made more efficient and more effective through the use of computers, but not one of them requires a computer.

2. Adopt a "triage" philosophy about computers and the people who use them. Some of your colleagues and students will learn because of what you do to help them. Others will learn very little, despite your best efforts. And others will learn a great deal, despite all manner of impediments.

3. Avoid getting hooked on programming. Eventually, it will be necessary to modify, write, or supervise construction of a program. It is generally better to get someone else to do such work than to do it yourself. This requires at least enough knowledge to be able to communicate with programmers about programming.

4. Learn to ask for help. College computer centers and instructional development centers can be helpful in solving problems about hardware. So can reputable retailers. Local users' groups are excellent sources of information about software designed for mass markets. Some of the best advice comes from off-campus people who know nothing about what you want to do, but who are willing to help by letting you think aloud about your needs.

5. Don't trip over your own ego. Vigorously avoid becoming the only available "local expert." One way to do this is to delegate the responsibility for unpacking and implementing new arrivals. A far better way is to immediately teach two other people how to use any new product. Let them be the experts (i.e., promote independence, not dependence). Finally, recognize that the people with the most knowledge may have the least authority, and vice-versa (there's a good chance that several of your students already know more than you do). Be clever, but be humble, too.

ACKNOWLEDGEMENT

This paper is based upon a presentation given at the Leadership Training in Computer Technology Workshop (New Orleans, Louisiana, February 2, 1985) sponsored by the American Speech-Language-Hearing Association. Joan Cooper, Project Director of that workshop, provided helpful comments on an earlier version of this manuscript.

Table 1. Examples of special-purpose tools for various research activities (modified from Church, 1983).

Research Activity	Special-Purpose Tools
1. Search of literature	--Books, journals, note cards, abstract services
2. Generation & presentation of stimuli	--Oscillators, filters, amps, mixers, razor blades & splice blocks, tape recorders, cameras, pen & paper, ear phones
3. Experimental control	--Modular logic systems, written protocols, graduate students
4. Acquisition of responses	--Fingers, buttons, mics & other sensors, event recorders, pen & paper bioamplifiers
5. Recording of responses	--EM counters, pen & paper, graphic level recorders, plotters audio & video recorders, oscilloscopes
6. Storage of results	--File cabinets, log books, cameras, note card, pockets
7. Reduction and analysis of data	--Calculators, graph paper, hand calculators, rulers
8. Development of theory	--Data tables, statistical tables
9. Evaluation of theory	--Graph paper, calculators, pen & paper, enemies
10. Preparation of figures & tables	--Lettering sets & other drafting equipment, cameras, copy machines, lab assistants
11. Preparation of manuscript	--Pen & paper, typewriters, copy machines, correction fluid, secretaries, editors

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EXAMPLES OF COMPUTER TECHNOLOGY INFUSION TO COMMUNICATIVE DISORDERS COURSE CONTENT

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INTRODUCTION

The purpose of this document is to suggest categories of computer applications that might be infused into a communication disorders (CD) curriculum. These suggestions are presented in tabular as well as textual format. In the tabular format, cells containing three asterisks indicate readily implementable applications. Those with one asterisk indicate probable applications that might require software or hardware that is not readily available. Cells containing no asterisks indicate that at present there are very few applications that would apply. Cell ratings are based on: 1) the relevance of the application to the course; 2) the availability of technical software; and 3) the amount of technical computer skills that would be required.

Within the table, eight categories are identified as examples of major divisions of commonly used CD-related software; eighteen representative course titles are used as examples of academic divisions. Twenty of the tabular cells indicate that corresponding examples of infusion follow. The table that follows as well as the exemplary applications are to suggest possible academic applications and to provide a skeletal framework for reviewing CD curricula.

COMPUTER APPLICATIONS BY COURSE

Computer Topics and Applications

COURSE TITLES	WORD PROCESSING	SPREADSHEET & DATABASE MANAGEMENT	STATISTICAL ANALYSIS	LINGUISTIC & PHONOLOGICAL ANALYSES	COMPUTER ASSISTED INSTRUCT.	ACOUSTICAL ANALYSIS & DISPLAY	DIAGNOSTIC & THERAPY APPLICA.	PHYSIOLOGICAL ANALYSIS
ACOUSTICS		*	*	*	*	*** EXAMPLE #1		
ANATOMY & PHYSIOLOGY					** EXAMPLE #2			*
INSTRUMENTATION		** EXAMPLE #3			**	***		**
LANGUAGE ACQUISITION		**	**	** EXAMPLE #4	*			
PHONETICS		**	**	**		*** EXAMPLE #5		*
PSYCHO-ACOUSTICS					*** EXAMPLE #6	***		
ETHICAL/LEGAL ORGANIZATIONAL	*** EXAMPLE #7	*** EXAMPLE #8			*			
RESEARCH DESIGN	***	***	*** EXAMPLE #9	***	*	*	**	** EXAMPLE 10
DIAGNOSTICS	***	**	*	*** EXAMPLE 11	*		***	*
CHILDHOOD LANGUAGE DIS.				***			*** EXAMPLE 12	
ADULT LANGUAGE DISORDERS	*** EXAMPLE 13	*		***	*		***	
VOICE, FLUENCY, ARTICULATION		*		*** EXAMPLE 14	*	**	***	*
NEUROMOTOR/ AUG. COMM.	***	**		***	**	** EXAMPLE 15	***	**
LEARNING DISORDERS	***	**	*	**	*		* EXAMPLE 16	
READING	*** EXAMPLE 17						***	
AUDIOLOGY EVALUATION	***	***	**		*	***	**	*** EXAMPLE 18
AURAL REHABILITATION	***	***	*	**	**	***	*** EXAMPLE 19	*
CLINICAL PRACTICUM	***	***	*	***		**	*** EXAPMLE 20	

EXAMPLES OF APPLICATIONS

Example #1

With the addition of appropriate analog interfaces, microcomputers can serve as useful demonstration instruments in acoustics courses. Software and special hardware interfaces from various vendors enable the microcomputer to provide digital oscilloscope displays, and to perform spectral analysis, waveform editing, digital filtering, acoustic modelling, and acoustic synthesis by rule. These programs are affordable, user friendly, and provide exceptional acoustic laboratory experiences. These programs, in conjunction with a video projector are effective in the classroom for demonstrating acoustics and acoustic analysis principles.

Example #2

Numerous Computer Assisted Instruction (CAI) programs are available for mainframe as well as microcomputers to teach fundamental, detailed anatomical and physiological concepts. Details which are often difficult to teach in a classroom setting can be handled well by drill and practice CAI programs. Programs are available which assist in the teaching about dental anatomy, cranial nerves, the vocal mechanism, oral anatomy, neurophysiology, and scientific terminology. The advantage of these programs is that they allow the student to progress at her/his own rate and to receive immediate feedback to each response. Many CAI programs provide the course instructor with valuable data obtained from the students' responses. Detailed testing is also incorporated into many programs.

Example #3

General purpose spreadsheet and database management programs are tools that are applicable to many aspects of the CD profession. They serve as a system for organizing records and for deriving information from those records. These capabilities are appropriate in a course on instrumentation because they can serve as the basis for cataloging and categorizing instruments such as audiometers, tape recorders, hearing aids, and computer programs. The spreadsheet provides a systematic means for conceptualizing the performance characteristics of a large number of hearing aids. Database programs can be used to document annual audiometric calibrations and to provide records of needed service. Spreadsheets are useful tools for maintaining inventories of instruments, batteries, and other supplies. Database and spreadsheet programs are also valuable tools for cataloging and categorizing computer programs that are owned by the facility and those that are available at resource centers (e.g. computer centers). Instrumentation courses seem to lend themselves well to learning about administrative applications of computers because the information, such as specifications of instrumentation and software inventories, is tangible and readily visualized.

Example #4

Language analysis of transcribed communication is a natural for the computer. Programs are available to provide detailed analyses of language samples to compare them to normal samples and to provide various word counts, word type counts, and structural analyses. The computer based language analysis is well suited to laboratory experiences associated with a language acquisition class because it allows the student to take numerous language samples and to analyze them without the tedia associated with analysis by hand. Language analysis is perhaps the most commonly used computer application in CD education programs.

Examples #5

The acoustical analysis and display programs cited in example #1 are also useful in phonetics classes. Of particular interest are their phrase editing and spectral analysis capabilities. Acoustic phrase editing can be used to digitize a speech sample and to edit it for isolating segments of speech for replay. Phrase editing also serves a a tool for isolating an acoustic sample for spectral analysis. Time domain and spectral analyses are obvious applications for studying and displaying the acoustic composition of phonemes, transitions, and noises that serve to mask speech. Digital speech display and analysis allows the instructor and the student to manipulate an acoustic signal with resolution that is not possible with analog techniques. Phrase editors have proven to be very motivating in classroom and laboratory settings.

Example #6

Although few programs are currently available for the psychoacoustics class, there are several that demonstrate the computer's outstanding potential for demonstrating acoustic perception. Because of its speed and computational capabilities, natural speech can be digitized and waveforms can be generated by formula and converted to analog output to simulate almost any psychoacoustic phenomenon. Unlike any previous tool, the computer with appropriate interfaces, can replicate any real or imaginary acoustic event. With a minimal command of programming, the course instructor can generate psychoacoustic demonstrations that can be displayed both auditorily and visually. Classroom demonstrations and laboratory exercises are becoming common place in psychoacoustics classes.

Example #7

Word processing is currently the most widespread application of computers. It has proven itself to be an invaluable tool in the organization and operation of CD clinics, research facilities, and everyday activities. Classes focusing on the organization of clinical activities provide optimal opportunities to familiarize students with word processing operations, strategies, and applications. Word processing is a practical vehicle for instructing students in acceptable letter formatting, form letter generation, and professional writing. Office

management strategies and secretarial time management often center around effective use of word processing and can be taught while concurrently developing students' word processing skills.

Example #8

As with word processing skills, spreadsheet and database management are essential tools for a clinician who must learn business and organizational procedures. Several available spreadsheet programs include effective tutorial components that guide the student in learning spreadsheet and database strategies as well as learning the procedures for operating the programs. These programs have been used in several institutions as laboratory experiences for organization and administration classes.

Example #9

Mainframe and microcomputer based statistical analysis packages are well suited to research design courses. Because documentation for these programs are typically authored for users with little computer sophistication, they usually combine research design information with program operating guides. Microcomputer based statistical programs are particularly suited to classroom use because they are interactive and allow the user to dialog with the system in declaring variables, parameters, and procedures. These programs are well suited to learning laboratory settings because of the user-friendly nature of the programs and the thorough documentation that accompanies the programs.

Example #10

A limited number of physiological analysis programs are available for general purpose laboratory use. These programs use special purpose interfaces to allow for data collection from electrophysiological amplifiers, respiration instruments, and other analog response sensors. These programs usually allow for rapid data collection and display of results. As such, they are useful tools for pilot studies and "what if" research. The use of a general purpose physiological response analysis program allows the instructor to set up demonstrations of physiological research and to involve students in data collection.

Example #11

Both phonological and linguistic analysis programs are valuable tools for a course in diagnostic procedures. First, they both provide highly detailed statistical reports of communication products (speech and language) that far exceed the usual phonological or linguistic analysis. The availability of elaborate reporting increases students' awareness of the many possible ways in which normal and deviant speech and language productions can be reported. Secondly, analysis programs are very structured and force the student to develop speech and language encoding skills. Whether or not a student ends up using computer analysis, the skills and strategies are valuable. Both linguistic and phonological analysis programs lend themselves to learning laboratory environments.

Example #12

There are numerous programs that emphasize language development and many others that tangentially focus on language. Many of these programs have merit and many do not. Because of the large number that are available, they can provide students with a basis for comparing one piece of software with another and for developing a reference as to good and bad programming, documentation, theoretical base, and applicability to language disorders. Most of these programs are very easy to use and therefore lend themselves well to a learning laboratory setting. Computer software can also be used to demonstrate clinical paradigms, good and bad strategies, clinical problems, and documentation of results. Because of the vast array of language development programs, their inclusion in a childhood language disorders course can provide a highly applicable foundation for appreciating other clinical uses for software.

Example #13

There are many generic computer programs that are applicable to rehabilitation protocols for adult aphasics. Word processing is one of those. It has been demonstrated that systems which facilitate information output also facilitate language processing. Basic word processors, with a simple instruction set, lend themselves to serving as a clinical tool. The patient can type in a sentence, verify that the intent is correct, then edit the sentence with the clinician's guidance to build an acceptable textual output. The procedure is a sturdy clinical tool, but it can (with the aid of a video projector) be an instructional tool to demonstrate for the class the struggle that an aphasic goes through and the processes that are used to construct an acceptable textual output.

Example #14

Several of the previously described programs are useful in a speech disorders class. Of particular interest are those programs which provide a phonological analysis of articulation errors. These programs are particularly well suited to learning laboratory setting in which the student transcribes audio recordings of disordered speech and encodes the transcription into the computer. The analysis program provides detailed statistical summaries of the sample. Repeated attempts at transcribing the same sample can verify a students transcription reliability; comparisons of transcriptions with a master clinician's can verify validity. The use of the programs has been demonstrated to be a good teaching tool.

Example #15

The microcomputer excels as an interpreter for non-verbal persons requiring an augmentative communication device. The speech synthesis capabilities, versatile input capabilities (e.g. speech recognition and joystick) are essentials for an maximal rehabilitation of many neuromotorically impaired individuals. Basic programming, special switch

interfacing, graphic displays, robotic control, and speech output are essential content topics for a comprehensive course in augmentative communication. Microcomputers are a must for classroom and laboratory.

Example #16

Special education materials abound for persons with learning problems. Very few programs, however, are directed towards persons with specific learning disabilities. A review of programs will reveal many that are advertised as being for the learning disabled, but few pertain to visually or auditorily disabled. Demonstrations of these programs in the classroom, along with a comparative analysis of program strategies, strengths and shortcomings provide a good learning tool about learning disabilities and an awareness that not all that is advertised for learning disorders is necessarily what it is claimed to be. Course content might focus on what aspects of computer programs are effective and what are not. Content might also emphasize the theoretical bases for various programs.

Example #18

Electrophysiological audiometric technology has become a commonplace diagnostic tool and should be taught in every audiology program. The microcomputer has made this technology affordable for most graduate education programs. The microcomputer in the audiology laboratory setting is a valuable tool for learning about the technology.

Example #19

When broadly defined, aural rehabilitation includes amplification, language stimulation, and other processes that facilitate communication for the hearing impaired. There are many computer programs that can assist the hearing impaired develop language concepts, writing skills, and pragmatic concepts. Learning laboratory experiences focusing on language development and concept development are being used in several graduate education programs to demonstrate the language components of aural rehabilitation. Acoustical analysis programs are also being used as therapy tools to demonstrate spectral components of normal speech and speech produced by severely hearing impaired individuals.

Example #20

Lastly, and most importantly, the microcomputer is well suited to clinical practicum. Often computer "therapy" is a period of time when the patient is seated at the computer and instructed to "play" with a program for a period of time. In this scenerio, computerized activities may bear no association with other planned activities. Clinical practicum is the optimal site for helping a student select the most appropriate piece of software, to help him/her analyze the strategies of the program, and to integrate it into the clinical paradigm. Clinical practicum can serve as the time for critical analysis of software and for developing the framework for using computers as professional tools.

Summary

If it can be assumed that microcomputers are becoming the essential clinical tool for Communication Disorders specialists, it becomes the obligation of graduate education programs to infuse into their programs not only information about the machine itself but also about its effective use as an administrative, instructional and clinical tool. There are many variables that enter into the infusion process. There are varying amounts of computer sophistication among graduate faculty. There are limited computer resources available to obtain hardware and software. And, there are many skeptics who question the role of the computer as a clinical tool. With these factors, and many others in mind, it becomes the obligation of the faculties of our graduate education programs to determine priorities, criteria for evaluating software and applications, and strategies for the infusion process. The examples which are included in this manuscript are not to imply and prioritize, rather they are to be interpreted as suggestions as to what might be workable. Good luck.

DISSEMINATION

DISSEMINATION

The following activities provided wide dissemination of this information and the products are still available to interested persons.

1. Information distributed to ASHA Directors Conference and Southeast Regional Conference, Summer 1984.

2. Asha, May 1984, June 1984, September 1985.

3. All participants in workshops received manual. (Appendix B)

4. All presenters in workshop received manuals. (Appendix B)

5. Manuals were sent to all graduate level programs in Communication Sciences and Disorders.

6. Manuals have been turned over to American Speech-Language-Hearing Association Publications/Marketing Division and are available at cost upon request.

7. Infusion guide published in C.U.S.H. Journal (Computer Users in Speech and Hearing), November 1985.

8. At the 1986 American Speech-Language-Hearing Foundation Computer Conference there will be a panel discussion and other sessions dedicated to the infusion issue. Leadership Training in Computer Technology workshop participants are encouraged to attend.

FUTURE IMPLICATIONS

FUTURE IMPLICATIONS

The impact of this project is difficult to measure in that the audience was limited to graduate programs in Communication Sciences and Disorders and Special Education and related fields. Time will tell how effective it has been--we educate the teachers, the teachers educate the students (pre-service) who will, as clinicians of tomorrow, treat the communicatively handicapped children and young adults.

The participants in this project have established a network, they have an awareness of activity in other programs and they have been provided some publications which are useful to them and others.

Graduate program personnel need to take charge now and to do the task at hand in this infusion process--to get beyond the talking stage. They know the issues and they have support systems to help them overcome obstacles such as funding and what hardware/software in which to invest the funds. As stated by Dr. Bartel (Appendix A), the job of teaching has changed; faculties have to put themselves in a more favorable position, and one way to do this is to "keep up with the times." The clinicians of tomorrow will demand to have the "latest" available methods of treatment for their clients. The value of this project will be seen in the next two or three years when it can be seen if the infusion of computer technology has been accomplished.

APPENDIX A

TWO PRESENTED PAPERS:

Nettie Bartel, Ph.D.
Herman Niebuhr, Jr., Ph.D.

FACULTY DEVELOPMENT IN COMPUTER TECHNOLOGY: ONE UNIVERSITY'S EXPERIENCE

Nettie Bartel, Ph.D.
Temple University

I would like to share with you today an odyssey I have been involved in. Those of you who heard Dr. Niebuhr yesterday know that there is a group of us at Temple University which for the last eight years has been meeting regularly to talk about higher education in general and, more specifically, higher education at Temple. How do we get ourselves repositioned so that we can constructively face the problems that higher education will need to face before the 21st century? I have been part of that group for that period of time. We have written some proposals for external funding and for internal funding. As a result, a number of changes have been implemented within the university. But, today I don't want to talk about those. I want to talk more specifically about a spinoff of that Faculty Seminar project as we began to call our efforts.

Approximately a year and a half ago I was asked by the provost of Temple University to conceptualize, articulate and implement a faculty development plan on a university-wide basis — a modest undertaking considering that Temple University has 5 campuses; over 40,000 students, all the professional schools including medicine, law, dentistry, allied health, art and music schools, etc. I am one who likes a challenge and being well versed in the traditions of academe, the first thing I did after agreeing to the assignment, was to flee to the literature and ask myself what's happening elsewhere. I learned a lot about what's happening elsewhere but also what is not happening elsewhere. It turns out that Temple University is very typical of other institutions throughout the country which have begun to realize that certain demographic, economic, fiscal, social forces are converging all at once on higher education, precipitating what will inevitably be a major crisis before the year 2000.

Let me share just a few little numbers and some thoughts that emerge out of those numbers. The average age of faculty members in degree granting institutions in the United States is 51. The average faculty member obtained his terminal degree (in some cases they were "terminal" degrees), 24 years ago. Juxtapose that information with the content we have been addressing in this conference. Twenty-four years ago Eisenhower was just winding up his presidency in the political arena. In the technological arena, mainframe computers were practically all there was in 1959. Ask yourself how much of what you learned in your doctoral program you use in teaching your students today. The answer is probably very little, especially when we are talking about technology.

Let me throw another few bits of information at you. Let's talk about supply and demand. There is an over abundance of numbers of faculty in most fields. This is due to the great expectations held for higher education in the past several decades. The best and the brightest went into Ph.D. programs and into university teaching. Most institutions are heavily loaded with older individuals who are tenured and who believe

rightly or wrongly they have job security protected under the traditions of academic freedom and tenure. Demand for faculty at a national level is not expected to catch up with supply until the year 1995 overall. So faculty members are in oversupply and, hence, in jeopardy at least for the next 10 years. Not only can one cite data to back up that assertion, but if you have been listening to pronouncements of university administrators, the perception is there that many faculty members are superfluous and obsolete, that universities and colleges are overstaffed and need to "down-size." The best estimates are that due to demographic shifts in the country as far as students are concerned (with the impending decline in numbers of 18-22 year olds) that up to 500 small colleges will go out of business by the year 1990. It is anticipated that by 1990, over 8,000 tenured positions will be lost involuntarily. That's a lot of folks who will lose jobs.

To summarize, we have a group of faculty who are older, who are predominately tenured, who got their training a long time ago but who are increasingly insecure as far as job security is concerned. This sets them up for certain kinds of difficulties when you begin to engage the issue of faculty development, engage the issue of bringing programs up to a state-of-the-art basis especially in the technology area.

I want to say a few more things about the nature of faculty morale and how faculty find themselves at the present time nationally and you can apply as you see fit at your particular institution. I might say parenthetically that Temple is almost exactly at the national norm. Our average age of faculty is 50.8 and its going up about .7 years per year. In other words a few people are resigning at the upper end but not enough are coming in at the lower end to stabilize so here each year our average age of faculty is going up about 2/3 of the year and that is expected to continue for the indefinite future. That's almost exactly the pattern that exists at the national level. Most faculty entered the profession during an era of rising expectations, e.g., higher education was seen as the solution to a lot of national problems, there was enthusiasm on the part of those who entered the field about the time that Eisenhower went out and Kennedy came in. Try to recapture the euphoria of the moment. The space race was still ahead of us. The belief was that intelligence, rationality, knowledge could solve virtually all of the significant problems facing the human race. Universities were looked to for providing leadership on that. Contrast that with the mentality today, the political mentality, think about the morale level in your university or college and you see that there has been not just gradual decline in expectation but an erosion of confidence.

Not only are faculty now receiving less status because of change in the national mood, but numerous studies have shown that salaries have not kept up with inflation. The sad reality is that many faculty have peaked as far as career development is concerned. Most universities are now in a retrenchment mode. There is no place to go after you become a full professor. I have been a full professor for 10 years at my institution. I

dabble in administration because "what do you do after you grow up?" Those positions are limited. How many jobs in our field at the full professor level have you seen advertised lately? In most places like mine, when a full professor resigns or retires or otherwise leaves, there is a collective sigh of relief and if the department is lucky, a new position at the assistant level is posted. Most of the time, the budget line simply disappears as a way of trimming back.

Faculty are in the position of receiving less—less salary, less status, less in the way of life opportunities, less travel money, less career mobility, less career advancement, and less job security. At the same time they are asked to give more. We are here today because we are asked to give more, update ourselves, to improve ourselves. Frequently the request becomes a demand with minimal institutional support.

We are also asked to give more, if you look at the kinds of students we are being asked to teach. Again, there is lots of data and most of us have experienced first hand so I don't need to go into details -- but we know that the numbers and kinds of students are changing. First of all, there are fewer students, particularly in the Northeast, Midwest, and heartland of the country, with the exception of pockets in the southwest and the extreme southeast. Numbers of students in, for example, the Atlantic states where Temple finds itself, indicate that by 1990 there will be 40% fewer 18-22 year olds. That means dramatic reduction in numbers of people attending Temple University and the institution is going to have to cope with that in some way.

If you follow trends such as SAT scores, you also know that many of the students entering college are poorly prepared. It's hard for the institution to turn them away when they need the numbers to keep the faculty busy. Also, the kind of student mix we are seeing is changing in other ways as well. Our schools now have more older students and more part-time students. The proportion of part-time to full-time is shifting in some parts of the country dramatically. Proportionally, more women and proportionally more minorities are being found in our schools. These are national trends with some fluctuation from one part of the country to another.

What all of that adds up to for the faculty member, is that the teaching job has changed. It is different to teach 45-year old women who are returning after raising a family than it is to teach 18-year old males. It is different to teach students who lack basic skills. It might not be better, it might not be worse, but it's different, and it means that faculty have to give more in the way of repositioning their content, their teaching methodologies, the way they think about their professional instructional tasks.

Now, here I am at Temple University asked to do something, develop a plan, "develop" these faculty. I looked around and I looked at our own patterns of institutional mobility and outplacement, etc. and I quickly came to the conclusion that I think is typical of institutions throughout the country. That conclusion is "what you see is what you get." If you

want new areas of expertise represented in a department, you're not going to hire new assistant professors the way we used to to augment areas of lack. What you do, you look at that 51-year-old faculty member and figure out a way to motivate the individual to alleviate whatever defenses are up. (I've encountered a few at my institution and I suspect at some of yours from what I've learned traveling and talking with people nationally). You say there are a couple of things happening in the technology area, there are a couple things happening in the international area, there a couple things happening to the American economy that could conceivably affect the curriculum in your department. How do you engage that? Those issues have to be raised sensitively. We'll return to this issue in a few minutes.

Yesterday Dr. Niebuhr talked about an additional complicating factor which I will mention and then go on. That problem is the external competition that we in higher education face. It is not enough that the problems that I have alluded to are present in the form that I have just described. At the same time, our monopoly on information communication is not eroding, it's gone! Some of us in higher education haven't noticed that yet and are still acting as if our exclusive right to grant degrees somehow automatically will deliver students at whatever tuition rate we decide to lay on the perspective customer, as if that state of affairs is going to last forever. Well, it will not. Dr. Niebuhr pointed out that the net amount spent by American business in human resource development (which is an euphemism for education and it includes not only technical training but includes things that we assumed were ours forever, namely liberal learning), has now outstripped the dollars spent by all American private and public post-secondary institutions. Some of our own graduates are employed by companies in my area, e.g., RCA which is very active across the river in New Jersey, employs an excellent human resource department, consisting heavily of Temple graduates. That's where they go after they get a Ph.D. You can't get a job in higher education anymore, so you go to business and do the same thing and undercut the very institution that granted you your degree.

Another problem specific to the technology area where we are really hurting as institutions of higher education in contrast to businesses is in the obsolescence of our equipment. One of the observations that is made repeatedly by computer and information science faculty members is that there is an inverse relationship between the status and influence of the institution of higher education and the up-to-dateness of their technical equipment. In general, many of the highest status institutions have the most out-of-date equipment because they got in early and spent the megabucks when it still took megabucks and by and large haven't been able to update as quickly as they would like. Frequently it is the newer institutions, like community colleges who have the most up-to-date equipment. That's just another dimension that complicates our task as individuals involved in higher education. How do we establish our credibility in the technical area? How do we establish our credibility generally when we take into account the demographic factors of ourselves as professionals, of our changing student clientele, of the changing realities of the world around us and the changing state-of-the-art as far as the technology is concerned with which we never seem able to catch up?

One of my presumptions in my assignment at Temple was that I wanted to think about faculty development, not as something that one does to faculty but rather to see it as a challenge in inviting faculty to change their behavior. One of the first things I did was to do a little survey of what's happening within the institution in the technology area. I should say just parenthetically, my responsibilty was broader than the technical area but I took as the first priority the technical area because there is a lot of sex appeal inherent in computers. As a way of launching the entire faculty development project I decided to move first on technical training. That turned out to be a good approach.

In the survey that I conducted along with other individuals with particular assistance from our Computer Activity Center and from faculty in the Computer Information Sciences Department, a couple of things immediately emerged. I think this would be again true of your specific case. The variability in the degree of sophistication among faculty is enormous. It would be impossible for me to overstate the variability, it ranges at Temple still from absolutely zero (e.g. there are folks who not only know nothing about computers, they have made it a principle that they will know nothing)! We have a few of those. At the other extreme, and this is very interesting, a high degree of sophistication exists among faculty outside the Department of Computer and Information Sciences, and almost all these individuals were self-taught. You recall yesterday Dr. Niebuhr was talking about the self-directed learner. At the present time, in the absence of a coherent university policy as far as faculty development in computer training is concerned, most faculty who have some expertise are the self-starters - the ones who are self-directed, who saw the application, who saw the need, maybe took a course or two. We have a handful of faculty at Temple, and I suspect in your institutions also, who completed the entire program in the Computer and Information Sciences Department as a way of enriching their own discipline.

I want to talk specifically about the role of Computer and Information Sciences Departments as it pertains to the entire issue of "how do we get ourselves, as faculty, up-to-date in the computer area. How do we get ourselves up-to-date so that we can address the issue before us today, namely how to change our curricula to accommodate our own students." Computer and information sciences represents a field that is very much in transition at the present time. It seems to me that information sciences is emerging as two things at once. It is emerging not only as a discipline in its own right, which is why most universities have a separate department in the same way that you have a department of history or geography or whatever. It is a knowledge base that can be described; parameters can be established for the information sciences. It also has the additional dimension of being a tool subject, in much the same way that English is a tool subject, as well as being a discipline.

The field is growing very rapidly. Most of the folks in the field are so busy meeting the needs of the overwhelming numbers of students who want to major in that area, that only a few of the more thoughtful ones have taken the time to think about, to self-reflect, and ask themselves "what is represented by a major in computer information sciences?" What

is essential about it? Because of this lack of reflection, my institution (and I hear horror stories from elsewhere) tends to have major political problems surrounding the issue of who "owns" the knowledge base around the computer area. These are issues of power and control. The typical paradigm is that the folks who got there first, the ones who say "we do computers, we've been doing computers since 1965, you see it on our department door - it says computers." The line of reasoning is "no one else should know about, no one else should teach about, no one else should have computers." That's the most extreme version of it. In some form, the larger ones. What seems to have happened is that as long as there was just a mainframe on each campus and just one department that had the word "computer" in it, the claim could be made with some legitimacy and some credibility that the ownership, the power and control resided in one location. As the hardware has changed, as we have moved from the centralized mainframe to first the minicomputers (there were about 6 scattered throughout my campus) and now finally to the ultimate decentralization with faculty members each having a terminal or a micro, at least in their departments and perhaps in each office. So, too, the issue of knowledge has gone through an analogous kind of decentralization. No longer is it clear to us that what one knows about computers is centralized in one location. The working out, the renegotiating of the relationship of the various departments who have specific interests in computer technology with that department whose specific agenda is computer and information sciences takes political savvy, and typically involves a power struggle. One solution to what we are addressing here is - we could just send our students over to the computer department and let them teach them. It's not a real solution for reasons we are all familiar with.

How do we tap into the expertise that resides in most of our computer departments? I have worked extensively and intensively enough with the faculty at Temple University in the department to know that there is a wealth of expertise there. That's true elsewhere. Most of us have taken our little workshops and courses and fiddled with our manuals and our tutorials and developed our expertise on our micros on our own. That is an inefficient use of resources when we have major expertise in our computer departments not being utilized for general faculty computer development.

I mentioned the variability is extremely great in the degree of computer expertise on any given campus. Secondly, as soon as you begin to get into the question of where is the expertise located on a campus? You run into issues of power and control and in one way or another they have to be addressed.

Thirdly, I want to say some unexpected suprises became evident at my university, and perhaps yours. Of all the departments at Temple who have developed expertise and operationalized that expertise - the most unlikely department imaginable has gone the furthest - the Religion Department. We have an excellent Religion Department at Temple University. Let me tell you what the state-of-the-art is in that department. A number of the faculty have particular expertise in Middle Eastern religions in exotic antiquated languages, etc. There is one person in that department that

has a little bit of engineering expertise and he has wired a roomful of equipment with different printers and different kinds of hardware so that the research interests of the faculty in these exotic languages can be adequately addressed. Temple University is now the only place in the country that permits one to do those kinds of linguistic analysis in obscure Middle Eastern languages. Furthermore, the department itself, having become intrigued with the research possibilities, began to bring its departmental management onto a technological basis. Not only the routine things one would expect but (they have 280 doctoral students) they track students on a continuing basis with a specially designed data base management system. They also have tapped into the career placement service in the religion area, so that on a continuous basis a department secretary knows what jobs are available for Ph.D.s in religion anywhere in the country and within a 24-hour turnaround the vita of students interested in that job are on their way to the perspective place of employment. They have a 100% placement rate. That speaks not only for the quality of the program but the very effective way that they are able to connect student resumes with potential places of employment. We are using that department as a prototype for a particular kind of faculty development experience.

Let us return to the question then: "How does one engage faculty in a differentiated university in a serious change process when it comes to the technology?" One of the things I found most helpful was a model of change that has been developed by Eugene Hall[1] and his associates at the University of Texas in Austin. He calls it the "concerns based approach to change." The title is a good one because it denotes that when you are dealing with a change process, different kinds of concerns emerge at different stages of the change process. The model also helps one to see that you don't cause people to change and then drop your support. The change process, as conceptualized by Hall and those of us who have dabbled in it a bit, is cyclical in nature and you never really get through with it. Change is not an event, it is a process. The facilitator of change is sensitive to the particular stage that person is at and is able to be responsive to the concerns expressed by that individual.

On the outline on the stages of concern, is the first stage - Awareness Stage. Concerns expressed at this level are that the subject does not want to know, does not want to be aware of the innovation of the change that is being proposed. Typically in education that is what you will get when there is talk about computers; you can tell when someone is at this stage when they say things like "Remember the teaching machines, those were supposed to save the world too, where are they now." End of conversation. The concern of the individual is that he doesn't even want to be aware.

At the next state, you are beginning to make a tiny bit of headway. The person has a glimmer that something is happening out there and he is at the Informational Stage of concern meaning that his concerns rotate around the fact that he doesn't know very much. This is the stage at which most institutions of higher education are making token efforts with faculty. What they are doing is offering a generic workshop of one sort

or another for computer literacy. I heard a conversation yesterday establishing a base-line knowledge base about computers so that folks will know the pieces of hardware, that they will know a little bit about different languages and their function, that they will know a little bit about the key applications of computers in a very general way. When people are expressing concerns pertaining to this general level of information they are at, what Gene Hall calls "the informational stage of the change process."

Once they know a little bit about computers, they have taken that introductory workshop, then you see a shift and the shift is to a higher level of anxiety and that gets us into the Personal Stage. Now folks are beginning to ask "what does that mean for me?" They are starting to get a little anxious. When you have just a superficial overview, computers can be very threatening because its easy to see how they can supplant one's own course, one's own job, one's own security in various ways. There is a noticeable and fairly dramatic shift then from the concerns that are cognitive in nature to concerns that are personal and active in nature. We have found at Temple that when we offer a generic introductory series of seminars or workshops on computers for the faculty, we need a sort of debriefing session, a chance for people to air their personal concerns because inevitably if you don't do that you leave them hanging and there is a lot of negative affective residual as people now know something but they are scared because they don't know enough yet to get them to the next stage which is the Management Stage.

The Management Stage of the change process is where you overcome your personal anxieties and you are beginning to think about operationalizing what you have learned. There is a higher degree of expertise that is involved here. It is much more practical in its focus, people are now saying, "ok, now what do we do with this?" I think many of us here are, at least in part, at this stage of concern. We are really asking "what does this mean for my program? How can I put it to use?" It's a very practical kind of set of concerns that emerge at that point.

When individuals have worked though the concerns of the first level of application, then they become concerned about fine-tuning or adjusting and adapting the applications, moving on to what Hall calls "the consequence." You begin to be very aware of how well whatever the adaptation is is working, whether it's a client management program, whether it's a CAI program, or whatever it is. You are not concerned that it's going to take away your personal security. You are not concerned that at an initial level you can work through the logistics. You now move into a stage of making it work well and that's the Consequence Level.

Once people have made a commitment to that degree, a fine-tuned in innovation, they then move into a stage of concerns that Hall calls "collaboration." Collaborators become change allies and we had those at Temple (I know there are collaborators here, I've heard you talking) where you yourself are converted and you are now out trying to bring somebody else along. That's why we are talking about it this morning. Presumably most of us, if not all of us, have colleagues who aren't there yet and we are collaborators with the change process.

The next stage, the Refocusing Stage is where you have enough experience and enough confidence with the innovation that you are able to, with confidence, reject it. You are able to say, this really doesn't do what I want it to do. You are able to fundamentally modify it, or, to find new uses beyond what is apparent. You can see as you refocus, you again engage Stage 1. The change process becomes cyclical. Once you begin to consider new uses for something, you are again at a very low level of information and you have to educate yourself to the new potential that you suspect is inherent in innovation.

At Temple, we tried to provide something for folks at all of these levels of concerns with the exception of the awareness group. We didn't do anything specific at this level, trusting that the normal processes of collegiality aided by the popular media would eventually have an effect. We didn't develop a master list and plug everyone into a stage. We did a fairly crude survey interviewing key people, making some telephone calls, etc.

Let me go through this two ways. We did two kinds of things. I want to talk about the content that we invoked and then formats that we developed. As far as content is concerned, the easiest thing of all was the generic introductory stuff. We have packages available, tutorials, texts, basic courses in computer literacy. Some were pretty good. Then we developed a full series of offerings in application areas. I want to speak just a little bit about this and give you the rationale for some of the thinking that we went through. We made the decision that word processing should be made available to every single faculty member and furthermore, two kinds of word processing opportunities should be made available. We decided to go with Word Star as one alternative for reasons that I probably don't need to iterate. We recognized that some faculty members don't use word processing on a continuing basis and if you have worked with Word Star, you know that you need to use it continuously to remember the commands for the program. So we also offered a menu driven program, actually offered two, one being Volks Writer, a program that can be used both in a menu driven or a command driven mode and then we use Magic Window only because there is a very large group of Apple users on the campus. The overwhelming majority of them were using Magic Window, so it seemed to be a good idea to continue with that.

Then we offered basic spread sheet instruction, first going with Visicalc and Lotus 1-2-3 that we offered initially in simple workshop format but then modified it because if you have worked with spread-sheet, you know what the development of the unique model should be - specific application is the tricky part. People need some general introduction but where it really gets interesting is where the individual applies it to his particular field.

That was even more so the case in the third application that we provided in data base management. I spent a lot of time looking for the perfect Data Base Managment program and decided that it does not exist. So, instead we identified the faculty who dealt with large data bases in their professional field and came up with several categories. There are

medical types (medical records, diagnostic information, test results, etc.); there were the social administration types who have large numbers of client data in their research and in their field that must be contended with; there were special educators who have the individual education plan that we talked about yesterday. That is a very complex and interesting kind of data base management if you really get into it and look for its potential. It can be used for strategic planning, individual diagnosis, case management, and so on. Then there were faculty whose professional fields don't particularly involve large data bases but who wanted to know something about data base management for their own personal/professional needs. We hired someone from outside the university to review proposals submitted by faculty who had specific data base needs. The individual was asked to review those proposals and select one as a prototype on the basis of which a 3-day workshop could be tailored. Faculty submitting the other proposals would receive individualized technical consultation. My point is that when one moves beyond the simple generic introductory packages and simple applications to provide a real support for faculty in a research capacity, something that is specific and useful in your field, you have to individualize very quickly.

We also offered instruction in two programming languages, BASIC and LOGO with plans to move into PASCAL, and continue to offer instruction in an authoring language. We selected Pilot because of its versatilities and applications with so many machines. A little subgroup has grown out of that instruction. Folks who are interested in instructional design continue to meet after the series on Super Pilot are jointly working on development of software. This is a group from our Allied Health School and they develop beautiful software for instructing in medical technology- terrific graphics - very impressive.

We moved into the area of department management and developed a set of experiences where department chairs or co-chairs, together with their secretaries or administrative assistants go through a set of didactic hands-on experiences pertaining from word processing through management and student files, letters, etc. I had tentatively arranged for something for the department chairs and then inadvertently discovered how threatening it was to the administrative assistants and the head secretaries so we quickly changed our plans to include them as well.

Then, finally we had a couple of research groups that have developed. We have put out some publicity that asked for suggestions. There are only two at the moment but we will add additional ones. These are interdisciplinary faculty research groups that are focusing on a specific technological application or aspect. There is a group interested in telecommunications and another one on developing strategic thinking. The medical types in this group call it diagnostic decision-making. The departments involved are Military Science, History, Cognitive Psychology, Logic from the Philosophy Department, and Political Science. All are interested in the question of how one takes a large amount of information, some of it quantitative, some of it not quantitative and get that information to converge in such a way that a decision can be rationalized. They meet and try to reform their thinking and then the university provides

technical assistance in whatever form they request it - it might be programming, content analysis, or whatever. It's a totally different model than a canned workshop. In fact, what we discovered is that the canned workshops have limited appeal once you get into the more advanced levels of the change process and also once you get into the more sophisticated user. People's needs are so sophisticated and so differentiated that you have to have a very flexible way of providing support and I urge you if you are involved with a university that has some flexibility and some good will to point out in advance how you can't predict exactly the nature of the kind of technical assistance that you require.

I want to wrap up with a word about the different formats that we ended up using. I mentioned the typical workshops and I just now mentioned the technical assistance which the university is providing either through its internal staff or going outside where necessary, whatever type of technical assistance research requirement interest groups might come up with. Then we have another model where the services of a consultant are provided on an ongoing basis Friday mornings from 9 to 12 noon. We urge you to do this in the data base area. The people taking the workshop where a prototype was selected still had a lot of questions in their own particular application. We arranged for a data base consultant to be available. Faculty made an appointment and brought in the particular issue that they were interested in. Then consultation was provided once a week for 3 hours.

Another unique kind of format that grew out of a conversation that I had with members of my own department where we were talking of the need to reconnect with the applied field. There are a number of school districts in the Philadelphia area who do interesting things with technology not just in the computer area but particularly with interactive video. One of my colleagues is very heavily into that, has substantial expertise, but we couldn't figure out a way initially how his expertise could be lent to the particular district that was innovative in this area. We developed an exchange model in which the district would provide one-third of the time of one of their personnel to the university department and the department would provide one-third of the time of this particular faculty member on an even exchange basis (no salary money would change hands, each agency would pay their own personnel). We added to that a slight subsidy which originally the university picked up and then we got some funding from the Department of Education in Washington to run this. Since the original idea involved technology, we then focused the entire project on technology. This semester, for example, as part of the exchange, I am working with a small computer consultation firm in Philadelphia. Their particular expertise is adapting and tailoring data base packages to businesses and to non-profit organizations like hospitals. They have not dabbled with schools and we have a large number of private and public schools in the area. They would like to have my services in providing an entree into private and non-profit educational institutions. What's in it for me is that I am learning a lot about data base management. It's like "you scratch my back and I'll scratch yours." Very, very low cost. We estimate the cost about $2,000 for exchange and we pay each others parking. It's an incredibly effective faculty development mechanism, they win and we win.

I will close with a couple of observations one of which is a problem we haven't totally resolved at Temple and I think it's probably one you encountered at your institutions. How do you keep the training and the availability of hardware in some kind of synchronized relationship? At Temple I have been the university's point person on this issue. I wish I had a nickel for every time a faculty member said, "Look here, you are offering all this training. How come the university isn't providing computers for the faculty?" Temple has a long-range plan on the use of technology. The first stage of the plan is they are rewiring the entire 5 campuses and its going to take a while so that it will be 12 months down the pike at least before any hardware associated with this long-range plan begins to make its appearance. It's sort of a catch-22. We train people, then they want their hardware and they're asking "Now, what do I do with this?" Folks who signed up for the department management workshop and their secretaries are all getting excited about computerizing their office management but what they have in their departments are 3 IBM Selectrics! So now they're demanding word processors and the tension is up.

Conversely, other institutions have the experience of providing a lot of hardware and it sits in boxes and nobody knows how to use it. So, a reciprocal relationship is really required. In order to intelligently ask for hardware, you have to have some degree of training among the faculty to avoid the kind of instant obsolesence or just getting the wrong stuff. You need some degree of training, but you can't give too much training without some material support because you raise the frustration level so inordinately that people get turned off and angry. We have done some evaluation of our efforts to date. Overall, Temple's efforts in this area have been extraordinarly well received by the faculty. The greatest degree of participation was from our Health Sciences campus. In part that related to the findings of the earlier survey. We have 14 schools within the university. The college that was furthest along generally, in terms of degree of sophistication was the College of Arts & Sciences, Education was second. Some really hadn't much at all. Health Sciences initially was quite far back with only a rudimentary level of expertise. Computer interest caught on like wildfire and those folks are now beating down the doors of central administration demanding hardware which, of course, is part of the conspiracy as far as I am concerned and it seems to be working.

TECHNOLOGICAL CHANGE AND THE FUTURE

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The New American Watershed

With the success and optimism of the post-war decades behind us, the nation finds itself in the midst of a new watershed period. Its dimensions are still coming into focus. The challenge of fundamental economic transformation is the most visible component. Given the dynamics of the global economy our economic future lies in the metaphor and realities of high technology, telecommunications, information, and specialized manufacturing. As in previous periods of basic economic change, we live in a turbulent environment. There is growing self-criticism, structural unemployment and fear of an uncertain future.

A second dimension of the new watershed is the sense that our communal, public and political lives are in decline. Given the widespread retreat into privacy, can we muster the collective will to effect the economic transformation, recreate safe and caring communities, and infuse our politics with a vitality that goes beyond the single issue?

A third dimension of the new watershed is the turbulence in our personal and family lives. The old certainties have diminished for most of us, and we face new freedoms and choices without the understanding and support of our mainstream institutions.

The current fashion is to see the economic issues apart from the communal and personal dimensions of the watershed. This is short sighted. Unless we move to make all aspects of our national life whole again, it is unlikely that we will summon the courage, creativity and commitment required for the economic tasks. Basic to all of the dimensions of the watershed is the capacity of the citizenry to make the necessary adjustments and do what must be done.

A century ago, the American nation negotiated a similar watershed. It was a turbulent period as well, characterized by the fears and insecurities we face today. It was also a period of social, organizational and technological inventions. This creative spurt laid the foundation for what Walter Lippman called the "American Century," an era of economic success, national optimism, and growing international pre-eminence. If our forefathers could summon the creative energies to negotiate the watershed, why can't our generation rise to the challenge as well?

Among the most creative and successful inventions of the last watershed were those institutions which helped the citizenry learn how to cope with the challenges. The land grant institution, the urban colleges, and the vocationally-oriented school came to life and sped the transition.

The national learning process took a giant step forward. In addition to fueling the economy with a more competent manpower pool, the quantum leap in human learning had a ripple effect in creating a richer and more humane public and communal life. Personal and family life was enriched as well. As we face the challenges of the new American watershed, it is well to recall the lessons of the last watershed. Unless we all see the tasks in larger perspective, we might well miss the opportunity that lies before us.

The Crisis in American Education

The love affair between Americans and their schools and colleges is at low ebb. Although there have been rocky moments from time to time the level of confidence in the formal educational institutions has never been lower in this century. As the business and political leadership have come to identify the "human resource" issue as basic to the economic transformation in the last few years, the pressure on schools and colleges to do better is building.

Yet, as the importance of human learning comes into focus, whether at the level of functional literacy or more effective management, there is a vacuum of leadership in both basic and higher education. Given the manifest signs of the crisis, the demographic and economic pressures, all the leadership can think about is retrenchment of personnel for the next two decades. The bravado claim that we will emerge "tougher and leaner" as the average age of teachers and faculty approaches sixty is not persuasive.

The argument here is that the demographic and economic challenges are masking the real problem: the obsolescence of the educational model. The failure to remain current with the changing learning needs of the people and especially those related to the workplace is evident in the growth of the "shadow educational system" within business, a system which in the aggregate rivals the scope of American higher education. With the exception of the community colleges most segments of American education have forgotten the terms of their social contract negotiated a century ago: to take leadership in the continuing development of the people, communities and economy of the nation. Unless educators face the crisis of their own legitimacy, they will be tangential to the developing economic transformation. Other institutions, most probably the American corporation itself, will move in to fill the vacuum. The citizenry must be literate and competent to negotiate the watershed.

Back-to-Basics

We have now come full circle. The obsolescence of American education in the 1860s led to the reinvention of new institutions that met the learning needs of the mass industrial transformation. The new American

watershed has reinforced the need for many of the competencies of that era and added new learning requirements to be met. While the signs of obsolescence are most pronounced in the schools and universities, neither the community colleges nor the corporate educators have yet adjusted to the new needs, useful as many of their activities are. Given the fundamental character of the new American watershed, it is time to ask the basic questions:

- What is it that Americans need to learn in order to achieve our economic, communal and personal goals?

- How shall these necessary life learnings be acquired?

These are the fundamental issues confronting every human community from the earliest tribe to the present complex global environment. But until today, we have not needed to approach them in a comprehensive and explicit manner. No profession or institution has the assignment of guiding its society in these manners. But we must begin.

We might begin by reminding ourselves that human learning is instrumental to explicit or embedded economic, communal and personal goals. Since these goals change from time to time, the necessary learnings also change. We might continue by reminding ourselves that the necessary life learnings come from many institutions, not just school or college. There has always been, is now, and will always be a system of human learning. We would have to conclude that the contemporary system of human learning is in some disarray. The newly emerging economic goals by themselves render the old system, geared to a mass industrial economy, obsolete. Additionally, the decline of the tradition-based institutions within the system, family, church and community, has led to the loss of the old indoctrinations which gave shape to our role, value and effective learnings. While the loss of the old certainties provides each of us with new freedom and choice in our personal and communal lives, we have not yet engaged the new freedoms and choices very effectively. Turbulence in personal and communal living is the consequence.

For all of these reasons the nation needs to organize a once-in-a-century update of the learning process. In this context the "back to basics" movement in the K-12 domain avoids most of the fundamental issues. Additionally, the current trendy concerns with math/science instruction and computer awareness and literacy, important as they are, fail to deal with the essences of the problem. To really get "back to basics" involves constructing and implementing a new learning paradigm.

As in all such paradigm shifts there is already a body of theoretical work, innovation and experience on which to build. At least five "megatrends" leading us to the new paradigm are clear.

The Five Megatrends

The five megatrends leading to a strengthened national learning process are:

• A Shift to Expanded and Explicit Goal Setting: As suggested earlier, learning is instrumental to personal, communal and economic goals. In the present paradigm some goals are explicit and some are embedded. We are clearly shifting from the narrow range of explicit personal goals, largely restricted to intellectual and career choices, to expanded goals in role, value and affective aspects of living. We are also clearly shifting toward more explicit goal setting in the economic area, generating a new learning agenda in the process. We are on the verge of developing more explicit goals in our communal life as we note the decline of our neighborhoods, our public and our political life.

The consciousness of the need to shift to expanded, explicit goal setting varies enormously as do the means of such explicit goal setting. But as persons, communities and those responsible for the economy move to more explicit goal setting, the basis for an updated learning agenda will be established. We will then be able to answer the first basic question: what is it that Americans need to learn? in a more effective way than we can today.

• A Shift to Expanded Intentional Learning: Given our institutional myopia we forget that the present array of intentional learnings is only the tip of the learning iceberg. Most life learnings came through the unintentional, indoctrinating learning processes of family, church and community. But as these institutions have declined, each of us has new freedoms and choices in the role, value and affective dimensions and therefore new responsibilities of intentional learning in those areas. While we can see evidence of this shift in the self-help literature, the growth of life planning programs and the range of HRD activity in advanced corporations, most people and all mainstream institutions do not as yet understand or have as yet adjusted to this shift.

• A Shift to Increased Self-Directedness: Historically, authority-based indoctrinating learning has dominated the learning system. As we advanced into expanded intentional learning in schools and colleges, the authority structure was maintained through a teacher-centered pedagogy. But the expansion of personal freedom and choice, building on several centuries of political freedom, requires, as its corollary, expanded personal responsibility. Moreover as knowledge and technical skills change at an accelerated rate in an information age, each of us takes on the added burden of updating ourselves. The shift to self-directedness in learning becomes inevitable.

Although this shift has its roots in the ongoing evolution of American culture, it is being accelerated by the rapid development of telecommunications and computer-based learning systems. Again this shift is oozing into our consciousness when it ought to be placed on us as an urgent requirement of successfully negotiating the present American watershed.

• A Shift to Lifelong Learning: Although the metaphor of lifelong learning has been in the air longer than the other megatrends, it still largely fails to animate our personal or institutional behavior. The deficiency is particularly evident in the continuing dominance of terminal degree programs in the nation's colleges and universities, with the happy exception of the community colleges.

• A Shift to Explicit Learning System Guidance and Development: In the present paradigm we focus almost exclusively on the formal educational institutions, our schools and colleges, as the primary sites of learning. As we rediscover the ancient truth that the necessary life learnings come from many settings, including the individual, we must shift from the obsolete institutional focus to the system as the entity in which policy, program, and process adjustments need to be made. Parents, families, communities, churches, media, the workplace, as well as schools and colleges must learn to understand their vital roles in an effective learning system and learn once again to work together.

Taken together these five megatrends add up to a once-in-a-century update of the American learning system. But the tooth fairy is not managing the shift. Human thought and energy are moving these megatrends along in diverse ways. Now that they have been identified, and now that the business and political leadership is pushing for a strengthened learning system, it is possible that human thought and energy can be applied to the shift and lead us safely into the Information Age. We now turn to the means of accelerating the shift.

Seven Implementing Strategies

The paradigm shift in the American learning system a century ago was engineered by people outside of the educational establishment. Most of the adjustments that took place within this century again came from the outside. A central issue today is whether the nation's educators can be the agents of their own reform, or whether outsiders again must do the job. In any event there are seven implementing strategies to speed the paradigm shift:

- Linking the Institutions in the Learning System: Educators, community leaders, church folk, businessmen, media people, etc. need to come together at local, regional, state and national levels to develop common understandings, shared goals and shared activities in pursuit of those goals. Any institution can take the lead in convening such a process and getting it underway. Given the distribution of power among the institutions, no one need fear that one will dominate. Hence such linking activity must be an authentic exercise in cooperation for the common good. Since every institution is mired in its own language, myths, and ikons, it will take some time to talk together. But there is no alternative.

- Orienting the Citizen-Learner: The present paradigm assumes that the learner knows what the tasks of learning are. The orientation and guidance programs of schools and colleges are very narrowly conceived. As long as the old indoctrinating processes worked, and the range of intentional learning remained modest, the assumption was tolerable. But with the rapid expansion of intentional learning the orientation of 233 million Americans to their new learning tasks has the highest priority.

  In our experience, such orientation can be built into an explicit life planning process that can be part of a course, freshman orientation, part of a re-entry program, and an activity in its own right. But our experience is only at the margins of institutional practice. Clearly such learner orientation needs to be conducted at community, regional, state or national levels utilizing the media and institutional communications in a synergistic way. If the Tylenol story can be impressed on the national consciousness within 24 hours, we ought to be able to sensitize a nation of learner-citizens to new understandings of their learning tasks almost as quickly.

- Developing Institutional Awareness: Just as the citizen-learner needs to understand the new American watershed and the expanded intentional learnings that flow from its changing goals, so must the mainstream institutions. The web of embedded goals, beliefs, programs and processes of schools, colleges, churches, communities, business, media, etc., that make up the present paradigm need to be challenged in a bold and explicit awareness-developing campaign. With most of the boards, management, and staffs of the institutions preoccupied with maintenance functions, the consciousness-raising needs to resort to the kind of hyperbole embodied in a "once-in-a-century update of the paradigm." Without such a campaign to achieve deeper understanding of the new American watershed we will fall short of making the requisite institutional adjustment. The growing pressure from the business and political leadership is a welcome first step. We now need to move from metaphor to policy and program adjustments.

- Sharpening the Economic, Communal and Personal Goal Setting Process: Since one of the megatrends of the new paradigm is a more explicit goal setting process in each of the goal areas, the organization and improvement of the process is a high priority. Nearly every state and many communities are organizing more sophisticated and complex economic goal setting processes and are beginning to identify more concrete economic development and the related manpower development goals. At the level of the individual, enhanced career and life planning services are beginning to emerge. But the self-help literature is still the primary support for most individuals. Communal goal setting lags far behind. Only the community education movement is moving into that vacuum.

- Adjusting Role Definitions: The emerging paradigm requires role adjustments by all mainstream institutional personnel. For board members and top managers, there is a need to help organize the sharper goal setting process, developing the system coalitions and managing the adjustment process in the schools, colleges, churches, workplaces, communities, media, etc. The rest of us who man these institutions need to develop new ways of supporting our clients and each other in assuming the expanded learning tasks. The rise of support groups, networking, and mentoring demonstrate that the role adjustment process is already underway.

- Supporting Expanded Intentional Learning: As citizen-learners come to understand the new realities, and formulate new goals leading to expanded intentional learning, how do the institutions support the process? It is in this aspect of the new paradigm where we need most to invent. The typical approach under the old paradigm with its cognitive emphasis was to add a new course. But what does it mean to add a course on "caring," "courage," "risk-taking," or "entrepreneurship?" Clearly the explicit and intentional learning of role, value and affective dimensions requires some new inventions.

  Based on the life planning experience some first steps are indicated. Explicit goal setting, assessment of present status, and organization of an action plan are helpful beginnings, and are indicated. But in the affective areas a more experiential approach seems indicated, buttressed with the kind of group support or mentor support that have always served when risks of change are taken.

- Adjusting to and Exploiting High Technology Delivery Systems: Clearly the new paradigm is required to get us to the high technology economy that is now being born. But the very same new technologies in telecommunications and computer applications will significantly alter our educational delivery systems. In addition to the direct instructional use of the new technologies there are two other considerations worth emphasizing.

  First, there is the role of the media in the learner and institutional consciousness-raising effort to bring the new paradigm to life. A concerted effort by the media, as suggested earlier, could develop the awareness of the new learning tasks and sensitize all of us to the substance of those tasks whether it be math-science, risk-taking, teamwork, etc. Again such media efforts can proceed at local, regional, state or national levels in concert with the other domains in the learning system.

  Second, basic and higher education need to examine their roles in the software development process. Unless they invent new ways to participate in that process, their role in the learning process will diminish considerably.

Given the five megatrends leading to the new paradigm, these seven strategies provide a set of concrete activities that would speed the implementation. The issue then is to have institutions, consortia, and coalitions of institutions begin to engage the relevant process at local, state or national levels.

Accelerating the Change Process

Within the past few years the climate for change in strengthening the nation's learning paradigm has been warming. The metaphors are being proclaimed by the business and political leadership and the urgency has been heightened by a score of national reports with 175 additional reports still in the pipeline. But the debate is largely within the terms and structures of the old paradigm. Useful as the debate has been, the argument here is that its outcomes will fall short of meeting the new learning needs of American society. The task is not a linear extension of the present paradigm but an awareness that we are at a moment of discontinuity in the way we conceive and implement our society's learning process.

The author and a number of venturesome colleagues have been working at the acceleration of the change process for the past five years. Our methods include dissemination in a variety of ways and the development of prototype projects, mostly underwritten by the W.K. Kellogg Foundation.

The dissemination activities include a score of papers published in journals of the mainstream institutions, speeches to local, state and national associations of the mainstream institutions, and a just published "megatrends" book, REVITALIZING AMERICAN LEARNING.

Like all first generation ventures the early prototype projects have had their problems in coping with the inertia of institutional practice.

- Thirty eight colleges in the Philadelphia area organized a consortium (CLEO, the Compact for Lifelong Educational Opportunities) to expand the adult market. In time the Board adopted the new paradigm and its imperatives as policy. But the progress in raising citizen consciousness and bringing about institutional adjustments in a major metropolitan area has been slow.

- A group of senior faculty at Temple University sought to bring the model to life at a large urban institution but were thwarted by a new administration committed to the old paradigm.

- Wilmington College has totally reorganized its processes to build on the megatrends and the implementing strategies.

- A group in Louisiana has persuaded the Governor to make the new paradigm the framework for state policy and the ripples of that decision have impacted other political organizations.

- A number of national organizations have been exploring the application of the new paradigm in their contexts. These include continuing education, community college, corporate educator, public broadcasting, K-12 and church organizations.

- Of all the national foundations only the W.K. Kellogg Foundation has seen the need for a more foundamental adjustment of the nation's learning process and has earmarked substantial funds to catalyze the adjustment.

Special Education and the New Paradigm

If the emerging paradigm deals with the "why", "what," "where," and "how" of human learning in new ways for the society as a whole, I would argue that special educators have anticipated the "megatrends" and many of the implementing strategies for their own clientele. Goal setting is sharper in special education than any other sector of education. The "what" of the special education curriculum goes well beyond the scope of intentional learning of the rest of American education. The "where" of special education is more ecological or systematic in its orientation than the rest of education. Special education also acknowledges the many modalities of learning and is therefore more open to the new technologies.

But my sense is that as creative and inventive as special educators have been toward their clients, they are still operating within the confines of the old paradigm as far as their understanding of their own life learning is concerned. The innovations conceived and implemented by Dr. Nettie Bartel in Temple's Special Education Program are a useful first step in redressing this imbalance.

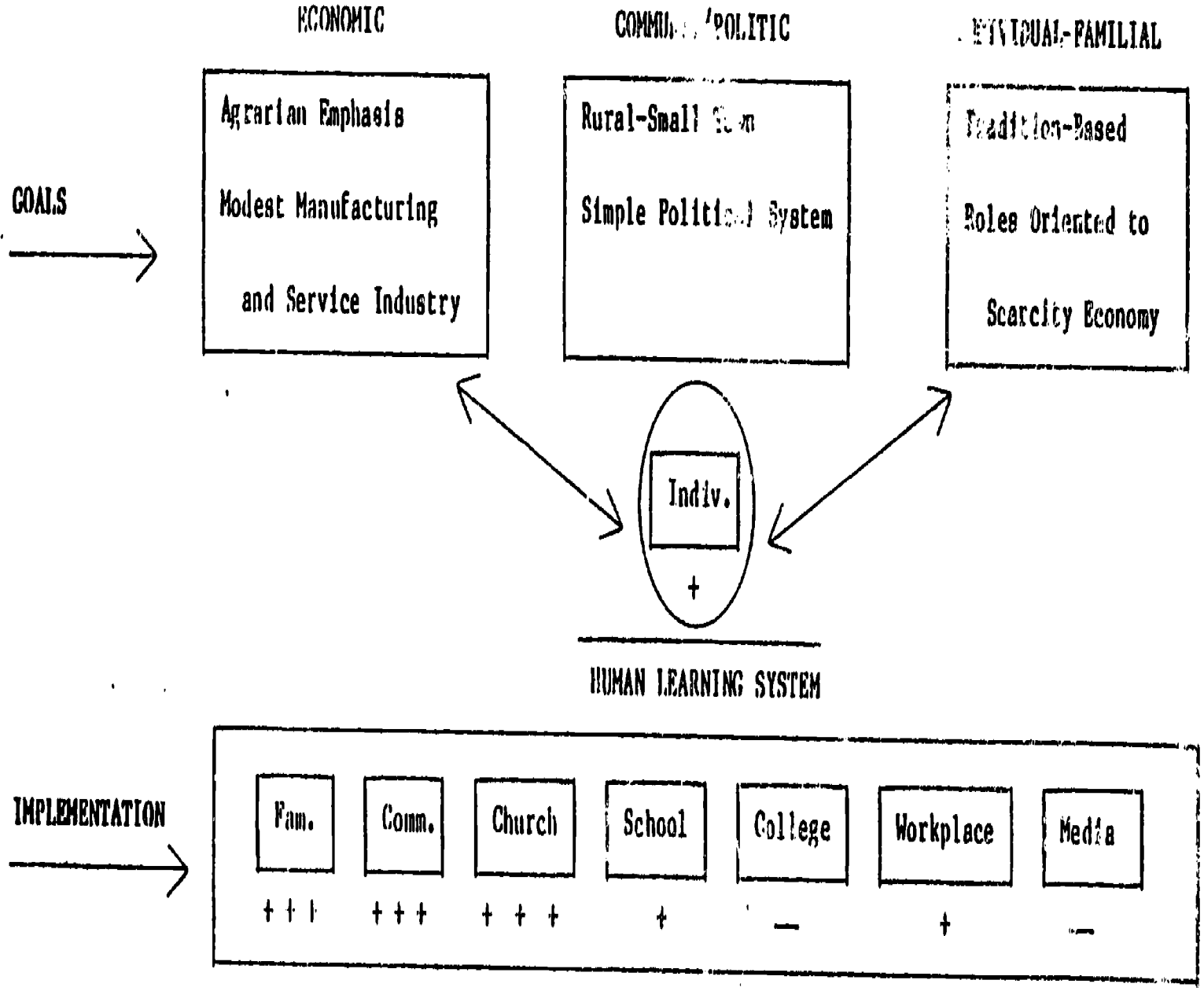
Additionally, while special educators have led the way toward an ecological perspective for their clients and have been open to the use of the new technologies at the micro levels of practice, I suspect that any consideration of the macro-ecological context of the handicapped and disabled as affected by the new technologies, especially the communications, technologies, has yet to take place. For example, as communities, regions and states move into more explicit communal goal setting and exploit the communications systems to energize, catalyze and implement the process, special educators will have a new opportunity and responsibility at the macro-ecological level of the profession. The example of THE CHEMICAL PEOPLE project in late 1983 demonstrated that a television documentary married to 12,000 local town meetings can bring about a quantum leap in citizen understanding and commitment in a very short time.

Conclusion

This paper has argued for a new framework in thinking about meeting the learning needs of the American economy in the '80s. Given the scope of the economic transformation confronting the nation and given the fundamental cultural changes of recent decades, the old learning paradigm which assisted the nation into the mass industrial age is no longer adequate. Adding on new training programs to the old structures with their obsolete assumptions will not ease our passage into the high technology, information age. But the outlines of a new and improved learning paradigm are in focus and its metaphors are beginning to enter the national consciousness. Building on expanded, explicit goal setting processes, an expanded intentional learning agenda confronts all of us. Each individual needs to take on the old and new learning tasks with enhanced self-directness in a lifelong context. Finally the new paradigm acknowledges that learning occurs in many sites and makes the "learning system" the basis for policy and program.

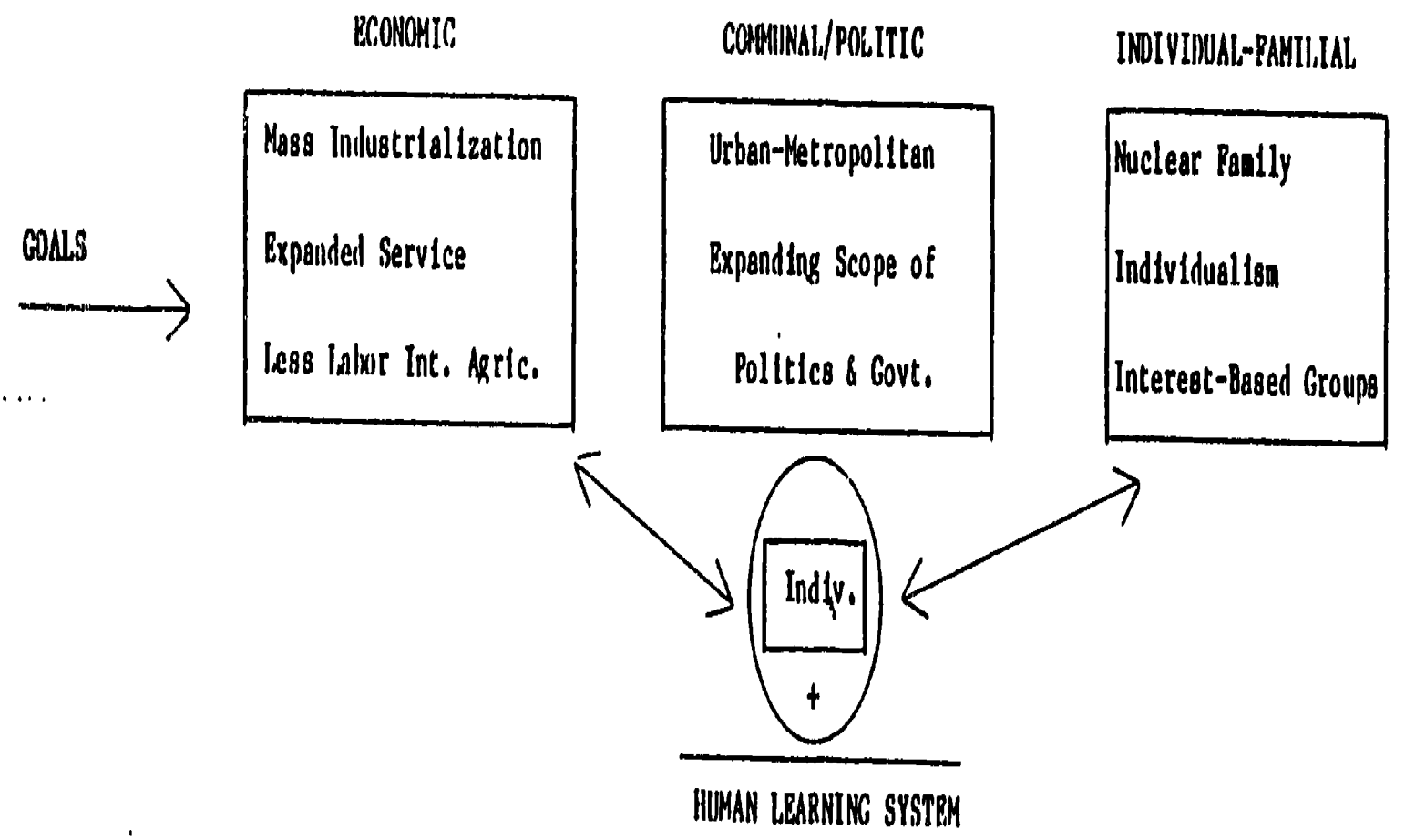
A century ago a similar transformation of the American learning paradigm took forty years to accomplish. Our generation has less than a decade given the urgency of the watershed challenges. The question is, WILL WE?????

1) PRE-INDUSTRIAL PARADIGM



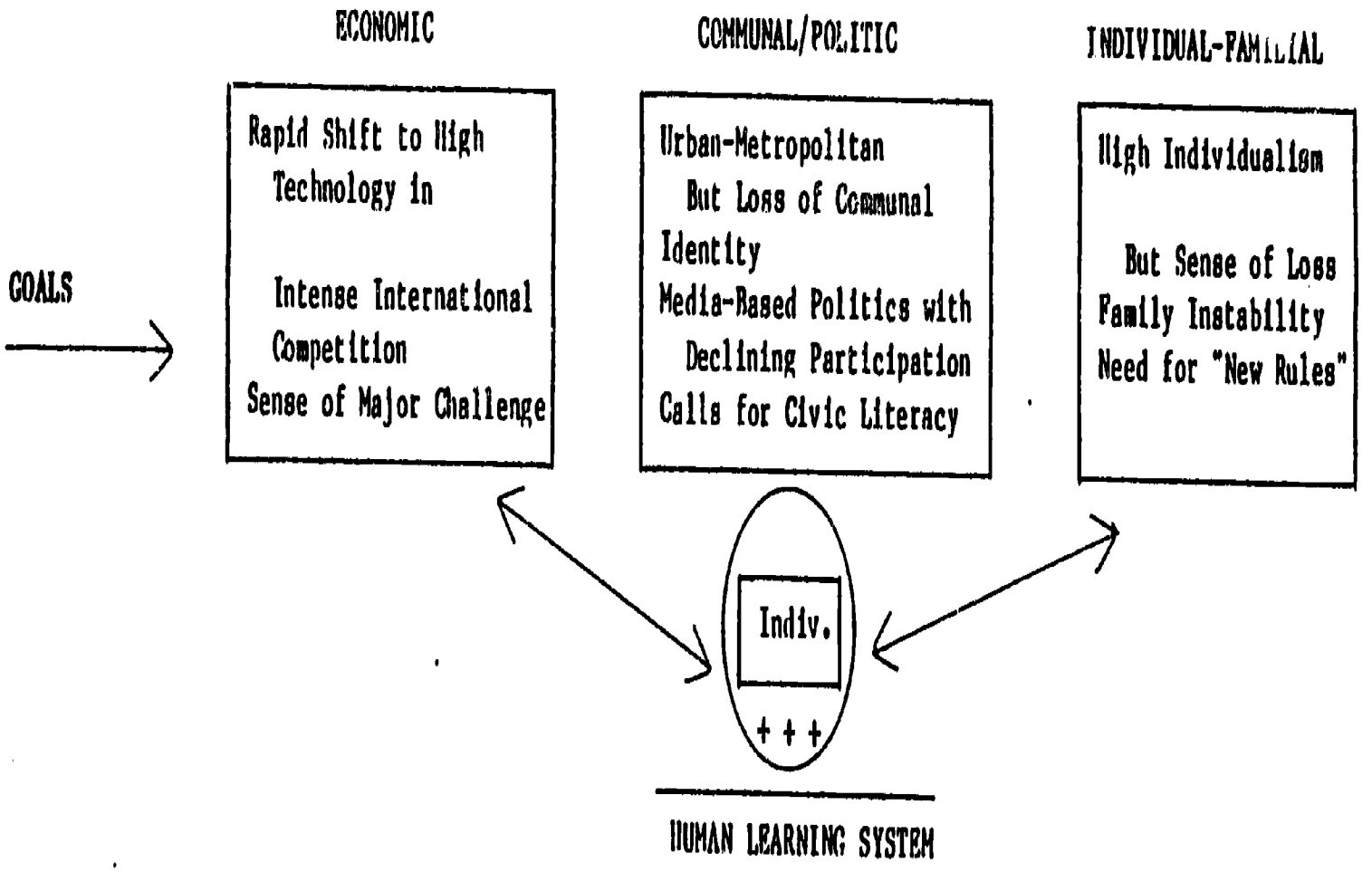
- o High Indoctrination-Low Intentional Learning
- o Traditional Institutional Domination
- o Embedded System Management
- o Formal Learning as Terminal Activity
- o Curriculum Narrowly Defined
- o System Inadequate to Changing Goals in Mid-19th Century

2) INDUSTRIAL PARADIGM



- o Indoctrination in Social-Sexual-Religious Affairs
- o Expanding Intentional Learning, Expecially in Work Areas
- o Declining "System Management"
- o Expanded Role-Power of Formal Education But Still Terminal, Except for Extension
- o System Successful for Century!
- o Signs of Disarray Since '60s

3) INFORMATION AGE PARADIGM



- o Shift to Expanded Explicit Goal Setting in Economic, Communal and Personal Areas
- o Shift to Expanded Intentional Learning in Role, Value and Affective Areas
- o Shift to Self-Directedness in Learning from Authority-Centered Pedagogy
- o Shift to Lifelong Learning Commitment
- o Shift to Explicit Learning System Guidance

APPENDIX B

SEPTEMBER, 1984 WORKSHOP

Participants

Faculty

Agenda

Sample Evaluation

LEADERSHIP TRAINING IN COMPUTER TECHNOLOGY

SCHOOLS AND PARTICIPANTS

New Orleans, Louisiana - September 1984 Workshop

UNIVERISTY OF COLORADO
Yoshiyuki Horii
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Richard H. Sweetman
Chair and Professor of Audiology

HOWARD UNIVERISTY
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Joan Payne-Johnson
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Carole J. Hardiman
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Anthony Holbrook
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Colleen Blankenship
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Chairman, Department of Communication Disorders and Sciences

John Bermejo
Lecturer, Communication Disorders

Steve Blache
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Michael Youngblood

UNIVERSITY OF KANSAS
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Barbara Thompson
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WICHITA STATE UNIVERSITY
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Lyman W. Boomer
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Harold T. Edwards
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Stuart I. Gilmore
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James Siders
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SYRACUSE UNIVERSITY
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UNIVERSITY OF VIRGINIA
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Paula Cochran
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Regina Sapona
Special Education

Ralph Stoudt
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Kenneth L Watkin, Chairperson
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Ann Arbor, Michigan 48109

Workshop Agenda

Friday, September 21

8:30 a.m.	Registration
8:45 a.m.	Introduction and Workshop Overview Nettie Bartel Bruce Mahaffey
9:00 a.m.	Presentations: Computer Technology in the Practice of Special Education Milton Budoff Computer Technology in the Practice of Communication Sciences and Disorders Gary E. Rushakoff
10:30 a.m.	Break
10:45 a.m.	Keynote Address: Comuter Technology and the Curriculum Curriculum: How are They Related? Milton Budoff
12:00 noon	Lunch with Dr. Budoff
1:30 p.m.	General Session: Introductions and Capsule Reports from Particpating Teams (10-15 min. each)
3:30 p.m.	Break
4:00 p.m.	General Presentation: Technological Change and the Future Herman Niebuhr, Jr.

Saturday, September 22

8:45 a.m.	General Presentations: Faculty Development in Computer Technology: One University's Experience
	Nettie Bartel
	Retooling of Special Education Faculty in Computer Technology
	Elizabeth McClellan
10:30 a.m.	Break
10:45 a.m.	Small Group Discussions: Facilitating Faculty and Curriculum Change from the Perspective of Deans, Department Chairpersons, and Faculty Members
12:00 noon	Lunch
1:30 p.m.	General Discussion: Identification of Issues that Need to be Resolved When Changing Curricula to Include Computer Technology
	Bruce Mahaffey
3:00 p.m.	Break
3:15 p.m.	Small Group Discussion: Focus on Specific Issues Raised in the General Discussion
5:00 p.m.	Optional Hands-On the Hardware
8:00 p.m.	Optional Software Sharing Optional Technological Demonstrations

Sunday, September 23

8:00 a.m.	Breakfast
8:30 a.m.	Animated Poster Sessions: Three Models for Computer Learning:
	(A) Through Computer Assisted Instruction
	Philip Cartwright
	(B) Through Technical Computer Training
	Kenneth Watkin
	(C) Through Exposure to Computers
	Lawrence Feth
9:45 a.m.	Break
10:00 a.m.	Small Group Discussions: Focus on Common Interests
12:00 noon	Reports from Small Group Facilitators Workshop Wrap-Up and Evaluation
1:00 p.m.	Workshop Conclusion

PART II: Please rate the following from 1 to 5 with 5 denoting very useful and 1 denoting not useful.

PRESENTATIONS:	1	2	3	4	5
Computer Technology in the Practice of Special Education (Budoff)					
Computer Technology in the Practice of Communication Sciences and Disorders (Rushakoff)					
Computer Technology and the Graduate Curriculum: How Are They Related? (Budoff - Keynote Address)					
Introductions and Capsule Reports from Participating Teams (Cooper)					
Technological Change and the Future (Niebuhr)					
Faculty Development in Computer Technology: One University's Experience (Bartel)					
Retooling of Special Education Faculty in Computer Technology (McClellan)					
Identification of Issues that Need to be Resolved When Changing Curricula to Include Computer Technology (Mahaffey)					
Animated Poster Sessions: Three Models for Computer Learning Through Computer Assisted Instruction (Cartwright)					
Through Technical Computer Training (Watkin)					
Through Exposure to Computers (Feth)					
SMALL GROUP DISCUSSIONS:					
Saturday, 10:45 - 12:00					
Saturday, 3:15 - 4:15 and Follow-up Reporting					
Sunday, 10:00 - 12:00					
SOFTWARE DEMONSTRATIONS:					
HANDS-ON EXPERIENCE:					

Thank you for your time and participation!

APPENDIX B

FEBRUARY, 1985 WORKSHOP

Participants

Faculty

Agenda

Sample Evaluation

PARTICIPANTS AND SCHOOLS

LEADERSHIP TRAINING IN COMPUTER TECHNOLOGY WORKSHOP

New Orleans, Louisiana - February 2-3, 1985

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Don Carver
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Joseph Smaldino
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Marion Thompson
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Gloria Kellum
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Leah Lorendc
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Lucille T. Nielsen
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Joel Stark
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Sharon Hanvey
Speech Pathologist

Cleavon Stratton
Clinic Coordinator

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Betty Ritchie
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Associate Professor, Communiation Disorders

Sally Cordio
Educational Media Consultant

Mary Huer
Assistant Professor, Communication Disorders

UNIVERISTY OF BRITISH COLUMBIA
Elizabeth Duncan
School of Audiology and Speech Sciences

FACULTY

LEADERSHIP TRAINING IN COMPUTER TECHNOLOGY WORKSHOP

February 2-3, 1985 - NEW ORLEANS HYATT REGENCY

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LEADERSHIP TRAINING IN COMPUTER TECHNOLOGY WORKSHOP

TENTATIVE AGENDA

February 2-3, 1985 - Hyatt Regency Hotel in New Orleans

FRIDAY

7:00 - 8:00 p.m.	WINE AND CHEESE RECEPTION AND REGISTRATION (Burgunday A & B)

SATURDAY

9:00 a.m.	Panel Discussion - (Nettie Bartel) American Speech-Language-Hearing Foundation Computer Conference
10:30 a.m.	Special Presentation - (Bob Aiken) American Speech-Language-Hearing Foundation Computer Conference
12:30 p.m.	LIGHT LUNCH (Burgundy A & B)
1:30 p.m.	Charge and introduction Networking, Student Labs, Management - (Mike Chial)
3:30 p.m.	Capsule reports form participants - (Joan Cooper) what works, what doesn't, how did you get started, how many faculty involved, how info is disseminated to students, where are you going?
5:00	ADJOURN

SUNDAY

8:30 a.m.	One university's approach to change - (Nettie Bartel)
10:30 a.m.	BRUNCH
11:30	"Poster Session" - (Mahaffey, Watkin, Rushakoff, Bull) followed by a general discussion
1:30 p.m.	ADJOURN

LEADERSHIP TRAINING IN COMPUTER TECHNOLOGY WORKSHOP

New Orleans, Louisiana
February 2-3, 1985

EVALUATION

Please respond to the following questions briefly.

1. Do you believe the objectives of the conference were met? Why or why not.

2. What do you believe should be the next step?

3. Do you feel this workshop has given you insights into how to integrate computer technology into your curriculum? Explain.

Please rate the following from 1 to 5 with 5 denoting very useful and 1 denoting not useful.

PRESENTATIONS:

	1	2	3	4	5
ASHFCC Panel Discussion (Cohen, Aiken, Bartel, Cartwright, Mahaffey)					
Special Presentation (Bob Aiken)					
Capsule Reports (Joan Cooper)					
One University's Approach to Change (Bartel)					
Poster Session (Mahaffey, Watkin, Rushakoff, Bull)					
Federal Funding (Martin Kaufman)					